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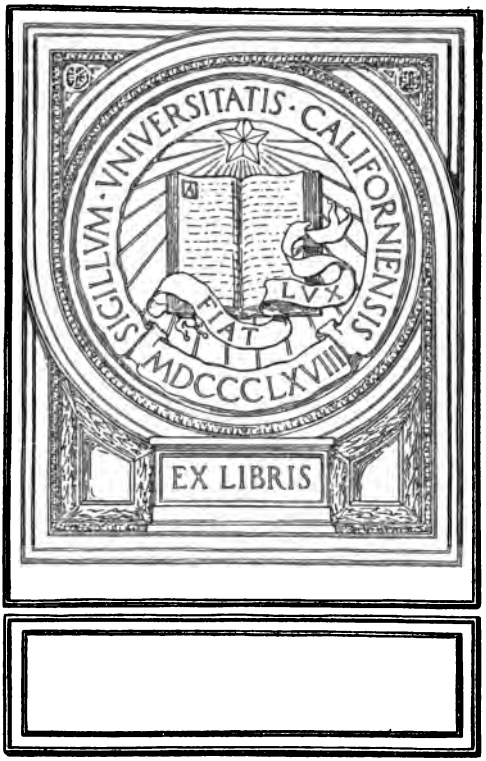

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United States Department of Agriculture,
Office of the Secretary.
Contribution from the Office of Farm Management,
W. J. SPILLMAN, Chief.

Suggestions Concerning Checking and Tabulating Farm Management Survey Data.

A DESK MANUAL FOR INVESTIGATORS.

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CHECKING AND TABULATING FARM MANAGEMENT SURVEY DATA.

The value of the farm management survey as a means of analyzing the agriculture of a locality is now quite generally recognized. Such an analysis reveals both the points of excellence and the defects of the local farming. The difficulties connected with work of this character and the very general interest in it render it desirable to set forth the methods required for satisfactory work. So far as may be at the present time, this is done in the following pages. It is assumed that the reader is familiar with the methods of gathering such data in the field. It is the use of the data after it is collected that is here considered. The subject will be briefly treated from the following standpoints:

1. Checking the office sheets.
2. Preliminary calculations.
3. Principles of tabulation.
4. Classification of farms by tenure.
5. Suggested tables.

CHECKING SURVEY RECORDS.

Survey records are taken on field blanks and later transferred to the survey record sheet, or office blank. These transfers should be made daily as the collecting of the data progresses. They should then be checked in accordance with the suggestions below, and where inconsistency or incompleteness is found, another visit should be made to the farm. Where a survey party consists of several men, one member should be expert in checking records. At the close of each day's work each field man transfers his records from the field blanks to the office blanks. The next day the office man checks these records while the field men are taking new records. In case the checking shows inconsistency or lack of necessary data,

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the same field man who took the original record goes back to the farmer concerned and gets the additional data.

A survey record generally consists of estimates made by the farmer as to the details of his business for the past year. Most farmers have the details of their business sufficiently in mind to give a satisfactory record, but in some cases it requires great skill on the part of the field man in reducing his questions to the terms in which the farmer thinks in order to get trustworthy information.

If a record is grossly inaccurate this fact is easily detected by the system of checking outlined below. Even if it is only slightly inaccurate this fact will usually show because of the numerous checks in the records themselves. The following is an outline of the work to be done in checking a record:

1. Compare the office sheet with the field blanks to see if all the transfers have been correctly made.

2. See if the total acres of crops, pastures, woodland, etc., equals the total farm area.

3. Examine the yields of the crops per acre to see if they are reasonable when compared with the normal for the year and locality. (See next paragraph.)

4. Examine the sales to see if prices and amounts sold are reasonable. If the price is unusual, there should be an explanation on the field sheet. In general, any unusual item on a field blank should be accompanied by a note of explanation, to show it is not merely an error.

5. Balancing the live stock. Certain inconsistencies in the live-stock record may be detected as follows:

Cows.—If the number of cows on hand at the first inventory be added to the purchases and the sum be subtracted from the sum of the second inventory plus sales, plus number died, the difference will show the number of heifers added to the herd during the year. Suppose this difference is six and that in the first inventory only four heifers were shown and that one heifer was purchased. This shows a mistake of at least one either in the number of cows or in the number of heifers. The number of heifers that became cows during the year might be zero in such a case, no matter how many heifers were on hand the first of the year. The point is: If the number of heifers added to the herd during the year, as determined from the number of cows, is greater than the total number

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of heifers on hand at the beginning of the year plus the number of heifers purchased, the record must be wrong.

Heifers.—The record of the heifers may be checked with that of the calves in a similar manner. In checking the record of the cows we find the number of heifers that became cows during the year. Add together the number of heifers in the second inventory, the number sold, the number that died, and the number that became cows; from this sum subtract the number in the first inventory plus the number purchased; the difference will be the number of calves that passed into the heifer class during the year. This number must not exceed the number of calves at the first inventory plus the number purchased.

Calves.—To find the number of calves born, add together the number at the second inventory, the number sold, the number that died, and the number that passed into the heifer class (determined in checking the heifer data), and the number that passed into the steer class, and subtract the number at the first inventory and the number bought. The number born should be consistent with the number of cows on hand.

Horses.—In the case of horses, add together the number at the second inventory, the number sold, and the number that died. Subtract from this the number at the first inventory plus the number purchased. The difference, if any, must be made up by colts passing from the colt class to the horse class during the year. If this number is greater than the number of colts on hand at the first inventory plus the number purchased, the record is wrong.

6. See if the amount of stock products sold is consistent with the number of animals on hand. If the receipts per cow figure out over $100 each, note whether the cows are high priced. They should be with such a product. On the other hand, if the receipts per cow are very low, the cows should be low priced. If the figures indicate a very high yield of wool per sheep, the price of sheep should be correspondingly high, and vice versa. If a stallion is shown in the inventory, look for breeding fees in the miscellaneous receipts. If animals died or were butchered, look for receipts from hides in miscellaneous receipts.

7. Examine the list of current expenses for the following points: Is the amount of labor, repairs, etc., consistent with the area of crops, the number of stock kept, etc.? If colts are reported and no stallion kept, there should be an item for breeding fees in current expenses. If the farm has no bull, there should be an item for breeding fees for calves in current expenses. If the farmer

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raises grain, but has no drill, binder, etc., there should be an item for machinery hire. If truck crops or fruit are sold, there should be an expense for barrels, bags, crates, etc. If the farmer retails milk, fruit, truck, etc., there should be a relatively large equipment in horses, wagons, etc., and a larger labor bill than on a similar farm which sells wholesale. If an engine is included in the list of machinery, there should be items for fuel and oil. If there is grain to thrash, clover to hull, etc., there should be an item for fuel and thrashing. If hay is sold, look for baling charges. An unusually large labor bill might be explained by machine work done for others or other outside work; also, by the construction of buildings, of laying tile drains, or building of fences, etc.

If the area of pasture is large and the live-stock inventory shows few animals on the place, look for receipts from pasture under miscellaneous receipts.

8. See if the rate of depreciation on buildings is consistent with the character of the buildings, as judged by their value.

9. Where new buildings or other improvements are constructed during the year care should be taken to see that the labor used in their construction is not included in the ordinary labor to perform the farm work.

10. Feed and supply inventory: The amount of feed on hand at the first inventory, plus the amount raised and the amount bought, less the amount on hand at the second inventory, should be consistent with the live stock kept to consume this feed. If there is no hay or corn in the first inventory, then some must be bought and should show in expenses. If the feed on hand at the beginning of the year is small, especially on dairy farms, some must be bought. If there is relatively a large amount on hand at the first inventory, the amount bought should be small.

In the case of seed for field crops, such as oats, if the amount for this year's seeding is included in the first inventory then the record should not show seed bought for the same crop during the year; or if it is so included it should not be charged as an expense, for this would make a double charge for this item. When a record does account for the item in both the first inventory and the expenses, the item of expense is usually found to be the amount the farmer has purchased for the following year's seeding, which item

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should be accounted for in the second inventory, otherwise it makes a double charge. It is usually best to disregard the purchase item altogether.

The difference between wheat sold, plus wheat on hand at the second inventory, and the wheat produced, plus wheat on hand at the first inventory, should be a reasonable amount for seed and bread.

11. See if the price per acre of real estate is consistent with that of other farms in the locality.

12. On small farms the estimated value of the farmer's labor, if very small, would call for big labor expense; but if large, would call for small labor expense.

13. If a farmer has owned a farm a long time and has considerable mortgage, this is inconsistent with a high labor income; but a new farmer with a big mortgage may have a good labor income. If the farmer began as a laborer, then became a tenant, then an owner, and now has no mortgage, this is proof he has made good labor incomes in the past and should do so now if conditions on his farm are normal.

14. All calculations in a record should be checked to see that no errors have crept in. Thus, if the original data consisted of area and total quantity produced, all yields of crops are calculated. If the original data consisted of area and yield per acre, the total production is calculated. All these calculations should be checked to see that they are accurate. All additions and subtractions should be gone over for the same purpose.

15. Receipts from sources having no relation to the farm business should not be included in the farm receipts; but when part of the labor or equipment belonging strictly to the farm is used temporarily outside the farm, especially in the case of exchange labor, the receipts for such use are a part of the business. Equipment used continuously in other business except for short periods should not be included in the farm business, and when used on the farm the value for such use should be set down as an expense.

16. Records for individual farms which the comparisons suggested above show to be distinctly in error must either be corrected by securing more accurate data or they must be discarded. It is essential that a survey party should transfer the field record of each

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farm to the office record sheet while the survey is in progress, so that additional data may be secured from any farm for which the record is incomplete or inaccurate.

Before commencing the tabulation of survey data the records should be rechecked by a competent person.

PRELIMINARY CALCULATIONS.

Before beginning the tabulation of the data from a farm management survey it is necessary to make calculations to obtain all the figures required in the tabulations. These calculations should be made, and the results recorded on each farm record sheet; or better, on a factor sheet prepared especially for the purpose. The calculations usually required for each farm are as follows:

1. Value of real estate per acre.

2. Depreciation, interest, and repairs—total for buildings, fences, and machinery, per farm and per crop acre.

3. Per cent of capital invested in each of the following factors of production: Land, dwelling, other buildings, implements and machinery, live stock, feed and supplies, and cash to run the farm.

4. Working capital, in dollars, and in per cent of total capital. (The working capital consists of the investment in implements and machinery, live stock, feed and supplies, and cash to run the farm.)

5. Working capital per acre of crops. (If the survey is in a region where pasture land is of prime importance and where the percentage of pasture land on the different farms varies widely, the pasture area should be reduced to its equivalent crop area and added to the crop area, making the crop area equivalent of the farm, and this calculation should be based on crop area equivalent. See method of determining crop area equivalent under calculation No. 55b.)

6. Pasture area percentage. That is, the percentage the pasture area is of crop and pasture area combined.

7. Percentage of total crop area devoted to each crop.

8. Crop index. This is determined for an individual farm as follows: Divide the quantity of each field crop produced on the farm by the average yield of that crop for all the farms in the sur-

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vey; add the quotients together; divide by the total area of field crops on the farm in question.

9. Number of animals of each kind. This should be the average number of each kind of stock on hand at different times during the year. In the case of cows, horses, flocks of sheep, sows, and poultry the average of the first and second inventory is usually sufficient, except when some are raised and sold between dates of inventories. In the case of feeder steers or sheep the actual number fed should be given. When calculating the number of animal units for pigs that are raised and sold during the year, five such animals are usually considered an animal unit when the value indicates they had reached some 200 pounds or more per head in weight. If sold when the weight is much less than 200 pounds, 10 such animals are counted an animal unit.

10. Number of animal units for each kind of stock. An animal unit is the equivalent, from the standpoint of feed required, of a full-grown cow or horse. It is customary to count as an animal unit 2 head of young cattle or colts, 5 hogs, 10 pigs, 7 sheep, 14 lambs, or 100 poultry. In the case of feeder steers and feeder sheep the number of animal units calculated should be reduced in proportion to the time on feed as compared with the full year. Thus, 30 steers on hand six months will equal 15 animal units for the year.

11. Percentage of animal units of each class. That is, divide the number of animal units of each class by the total number of animal units on the farm.

12. Crop area and pasture area per animal unit. First, including work horses; second, excluding work horses.

13. Crop area and pasture area per cow. This calculation is important in dairy regions.

14. Total net receipts from each kind of animals except work horses.

15. Total net receipts from all kinds of animals except work horses.

16. Total net receipts per animal unit for each kind of animal except work horses.

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17. Per cent of receipts from each enterprise for which there is a net plus receipt. (Ignore enterprises having minus incomes, as these are sources of expenditures, not receipts.)

18. Crop acres per man. (See calculation No. 30 for method of finding number of men.)

19. Crop acres per work horse (or mule).

20. Cost of man labor per crop acre. The cost of man labor here includes the value of hired labor, unpaid family labor, and the labor of the operator.

21. Monthly wages. To find this, divide the total value of man labor, as determined in the preceding paragraph, by the total months of man labor.

22. Number of work horses per man.

23. Value of machinery per crop acre.

24. Cost of dwelling per crop acre.

25. Cost of other buildings per crop acre.

(In surveys including farms on which pasture is very important, the last three calculations should be made on the basis of crop area equivalent instead of crop area. (See No. 55–b.))

26. Value of dwelling in terms of net farm income.

27. Value of other buildings in terms of net farm income.

28. Value of all labor other than the farmer's.

29. Value of all labor, including the farmer's.

30. Number of laborers. This is the total months of labor divided by 12.

31. Productive work units, both man and horse, on crops. (See Table I.)

32. Productive work units, both man and horse, on live stock. (See Table I.)

33. Productive work units, both man and horse, miscellaneous. (See Table I.)

34. Total productive man-work units.

35. Total productive horse-work units.

36. Percentage of productive man-work units on crops.

37. Percentage of productive man-work units on live stock.

38. Percentage of productive man-work units on miscellaneous.

39. Percentage of productive horse-work units on crops.

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40. Percentage of productive horse-work units on live stock.

41. Percentage of productive horse-work units on miscellaneous.

42. Productive work units per man. This is the total productive man-work units divided by the number of laborers as determined in No. 30.

43. Number of productive horse-work units per horse.

44. Wages of operator per productive work unit. This is the labor income divided by the productive work units per man. It shows the operator's receipts for each productive work unit done by him.

45. Labor income per day. This is the labor income divided by 300, it being assumed that there are 300 work days in a year.

46. Per cent of income on capital, owner farms. First, without deducting value of owner's labor from farm income; second, making this deduction.

47. For tenant farms, determine the landlord's percentage of income on his investment and the tenant's percentage of income on his investment, if he has any.

48. Total value of feed produced.

49. Total value of feed purchased.

50. Total feed produced and purchased.

51. Total value of feed crops sold.

52. Total value of feed fed. This is the sum of the feed produced and purchased, and feed on hand at the beginning of the year, minus feed sold and feed on hand at the end of the year.

53. Value of feed fed per animal unit, including horses.

54. Value of feed purchased per animal unit, including horses.

55. Magnitude of business. A large number of the tabulations which should be made are intended to bring out the relation of magnitude of business to other factors. The magnitude of the farm business may be measured in any one of a number of different ways, depending upon the character of the farms included in the tabulations. Several of these measures of magnitude are discussed in the following paragraphs. The investigator should, after careful consideration of the character of his data, determine which of these measures will constitute the most accurate measure of magnitude of business and at the same time require the least work in

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calculating, and should then use the measure thus determined upon unless for some special reason it is desirable to use some other measure in a particular tabulation. The following paragraphs state the conditions under which each of these measures may be used:

a. **Size of farm in acres.**—The size of the farm in acres may be used where the type of farming is similar on all the farms, or nearly all of them, provided the proportion of land occupied by timber and by land devoted to pasture does not vary widely from farm to farm. In other words, in a locality where the farms are quite uniform in character, with about the same proportion of crop land, pasture land, and timber land, and with similar intensity of livestock enterprises, the size of the farm is a satisfactory measure of the magnitude of the farm business. Where it can be used it is by far the simplest measure; but there are relatively few areas where such a measure is accurate.

b. **Crop area equivalent.**—Where the type of farming is similar on the different farms but the proportion of pasture land and of woodland is highly variable, a very accurate measure of magnitude of business is the sum of the crop area and the crop area equivalent of the pasture area, which sum we may call the crop area equivalent of the farm. It is applicable in all cases where the type of farming is of approximately similar degree of intensity on the different farms. In order to reduce the pasture area to its equivalent crop area we have the following considerations:

We may assume that 30 pounds of dry hay per day is the daily ration for a mature animal and that the number of acres of pasture required to carry one mature animal during the pasture season will furnish the equivalent of this much hay. Let C represent the acres of pasture required to furnish this much feed daily. If the pasture season is 5 months, or 150 days, long it must furnish during the season the equivalent of 150 times 30 pounds of hay, which is $2\frac{1}{4}$ tons. Let T represent the average yield of hay in tons per acre on the farm in question. We then have C acres of pasture furnishes the equivalent of $2\frac{1}{4}$ tons of hay; C acres of pasture are equivalent to $\frac{2\frac{1}{4}}{T}$ acres of hay; 1 acre of pasture is equivalent to $\frac{2\frac{1}{4}}{CT}$ acres of hay; P acres of pasture are equivalent to $\frac{2\frac{1}{4}P}{CT}$ acres of hay, where P is the total acres of pasture on the farm. Thus, to find the number of acres of hay to which the pasture on the farm is equivalent, multiply the number of acres of pasture by $2\frac{1}{4}$ and divide the product by the carrying capacity of the pasture (acres per animal) multiplied by the average yield of hay in tons per acre.

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Even if it is necessary to estimate roughly the carrying capacity of the pasture, this measure of magnitude of the farm business will usually be more accurate than merely the number of acres in the farm.

c. **Days of productive labor.**—Unless there is a very great difference in the type of farming on the different farms to be tabulated, the total number of days of productive labor on the farm will be a fairly accurate measure of the magnitude of the business conducted on the farm. It is especially accurate where the relation of the capital invested to the amount of labor required is about the same on the different farms; but if on some of the farms there is a very large amount of capital with relatively little labor, as is the case on live-stock farms devoted largely to pasture, while on other farms there is an enormous amount of labor with very little invested capital, as is frequently the case in fruit and truck growing propositions, this measure of magnitude becomes quite inaccurate.

d. **Working capital.**—When the type of farming is similar, the total amount of working capital is a very good measure of magnitude of business. The working capital is the sum of the value of the live stock, machinery and tools, feed and supplies, and cash to run the farm. Its calculation has already been provided for in Preliminary calculations, No. 4.

e. **Cost of operation.**—The most accurate measure of the magnitude of the farm business is the cost of operation for the year. This consists of interest on capital, wages of the operator, current expenses, decrease in feed and supplies, and depreciation of buildings, fences, and equipment. That this is the most accurate measure of the magnitude of the business is shown by the fact that this sum is the greatest amount a farmer can lose in any one year, aside from the destruction of property by catastrophe. It should be calculated for every farm if comparisons involving factors depending on magnitude of business are to be made between groups of farms of distinctly different degrees of intensity. The only case in which it fails is that of a comparison between different localities in which the price of real estate differs greatly although the land is similar in productiveness; but such cases do not ordinarily arise in a single survey.

56. Measuring the magnitude of individual enterprises. It is ordinarily assumed that the net receipts from an enterprise constitute a measure of its magnitude. This would be true if the net receipts from each enterprise were always in proportion to the expense of operation, but unfortunately this is not always the case. Not infrequently a large enterprise produces a negative net income and small ones often do likewise. Since the quantity here under

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discussion is only to be used in obtaining averages, it will seldom lead to wrong conclusions if these minus incomes be simply left out of consideration. (See calculation 17.) The difficulty can be completely overcome by using the total expense of conducting the enterprise, including interest on the required capital, as the measure of magnitude. It will seldom be practicable to do this; the possible error in the other method is too small to justify the use of this more laborious one in ordinary cases.

57. Index of diversity. There are several expressions which may be used for diversity of business. Each of them should be calculated for use in different tabulations.

a. In localities devoted quite largely to some form of live-stock farming the percentage of incomes from crops is one way of expressing diversity. This percentage should be calculated.

In regions devoted largely to crop farming the percentage of income from live-stock enterprises is similarly useful, though farming may be quite diversified on the basis of crops alone, as, in fact, it may be also on the basis of live stock. In crop-farming regions it is well to note the percentage of income from live-stock enterprises.

b. The number of enterprises producing more than 10 per cent of the farm receipts may also be used as a measure of diversity, except in cases of extreme diversity. It is possible for a highly diversified farm to have no enterprises producing as much as 10 per cent of the receipts.

c. In some cases diversity has been measured by giving the number of enterprises producing given incomes, as $200, $500, $1,000, etc. This method is objectionable in that it does not distinguish between size of business and diversity of business. It leads to wrong conclusions because it attributes to diversity effects due to magnitude of business. The method should never be used. But if the income from each enterprise be expressed as a percentage of the total receipts of the farm this objection disappears. While it is of no value in studying the relation of diversity to efficiency in farming, since the expression for diversity is not a definite figure which can be used in tabulations, it is a useful method of presenting data to the farmer in farm management demonstration work. A good plan in such work is to classify the enterprises into groups producing 1–10, 10–20, 20–30, 30–40, 40–60, and over 60 per cent of the farm receipts. Two or three enterprises in the four higher groups and three or four in the two lower indicate a very satisfactory degree of diversity for most localities.

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d. It is possible to get a definite figure to represent degree of diversity by a slight extension of the principle involved in the last method. When the magnitude of any one enterprise approaches 100 per cent of the magnitude of the farm business the business is approaching the status of single enterprise farming. Also, when all the enterprises are equal in magnitude the number of these enterprises is a measure of diversity. The highest possible degree of diversity consists of an indefinitely large number of indefinitely small enterprises. Then when any enterprise increases in magnitude it tends to reduce the degree of diversity of the business. If the magnitude of each enterprise be expressed in percentage of the magnitude of the farm business, and if each magnitude be weighted according to its distance from zero magnitude, then the sum of these weighted magnitudes divided into unity will give a definite figure which is a very accurate measure of diversity, and which is exceedingly useful in studying the effect of actual diversity on the efficiency of the business. Since the magnitude of an enterprise is also its distance from zero, the weighted magnitudes above mentioned are simply the squares of the individual magnitudes. Hence the following simple rule for calculating the degree of diversity of the farm business:

Diversity index: First express the magnitude of each enterprise in percentage of the sum of all these magnitudes;[1] square each of these percentages; find the sum of these squares; then divide unity by this sum.

All the above calculations are easily made on the slide rule, squaring numbers by means of the slide rule being an especially easy and rapid process. The percentages should be expressed decimally and carried to the third decimal place. Thus 15.5 per cent should be expressed as .155. The squares should be carried to the fourth decimal place. One decimal place is sufficient for the final result. Example:

Magnitudes of the enterprises.	The same in decimals.	Squares.
$1,050	0.354	0.1253
750	.253	.0640
25	.008	.0001
875	.297	.0882
215	.073	.0053
45	.015	.0002
2,960	1.000 +	.2831=3.5

[1] If receipts from an enterprise are used as the measure of its magnitude, ignore all enterprises showing minus net receipts.

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This figure eliminates every other causal factor than diversity, and hence may be safely used in tabulations designed to bring out the effect of diversity on the efficiency of the farm business.

58. Adjusted labor income. In the older settled portions of the country magnitude of business is perhaps the most important factor in the success of the farmer. This means that, in the majority of cases, it has more influence on labor income than any other factor This being the case, it is difficult to bring out the effect of other factors unless the number of farm records is sufficiently large to insure the elimination of the effect of magnitude of business by the law of averages, or to permit grouping the farms first on magnitude of business and then subdividing each group on the basis of the factor to be studied. In any case, the law of averages will not eliminate the effect of magnitude of business if the factor to be studied itself depends on magnitude of business.[1] This difficulty may be obviated as follows: First group the farms on the basis of magnitude of business, making the limits of the groups as small as possible and still have enough farms (50 to 100 if possible) to give a reliable average for the labor income in each group; then express the labor income of each farm in percentage of the average labor income of its size group. We may call this percentage the "adjusted labor income." It is a measure of success in farming as affected by factors other than magnitude of business. Thus if the labor income of a 50-acre farm is 80 per cent of the average for its group, and that of a 125-acre farm is 80 per cent of the average for its group, these two farms are considered to be equally efficient, though the larger farm may have much the larger labor income.

This adjusted labor income should be calculated for each farm and recorded on the survey record sheet, or the special factor card if there is one. It is especially useful in dealing with factors which are influenced by size of farm. Thus, in studying the relation between type of tenure and labor income, we are confronted with the difficulty that in some localities, especially in the Northern

[1] The law of averages, which plays so important a part in the study of farm management survey data, may be briefly stated as follows: In cases where variations from a normal are just as liable to be plus as minus, the plus and minus variations will cancel each other if the number of cases averaged is large.

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States, tenant farms are usually somewhat larger, on the average, than owner farms, while share tenant farms are larger than cash tenant farms. In order to get at the real influence of type of tenure we must therefore eliminate the effect of size of farm. This may be done by using the adjusted labor income. If the number of farms in the survey were large enough the same thing could be accomplished by dealing only with farms of approximately the same magnitude of business. Again, the number of productive work units per man varies with size of farm, at least on small farms. We can eliminate the influence of size of farm and study directly the effect of number of work units per man on labor income by using the adjusted labor income. The proportion of feed bought also depends on size of farm; but if we use the adjusted labor income instead of the actual labor income of each farm, we are able to study the effect on labor income of the percentage of feed bought. Many other illustrations might be given of the usefulness of this adjustment.

Even when the factor the influence of which is to be studied has no relation to size of farm, such, for instance, as the effect of percentage of receipts from dairy products on labor income, we must depend on the law of averages to eliminate the fluctuations in labor income due to differences in magnitude of business. If the number of farms in each group to be averaged is quite large this will occur, but if the number is not large the elimination may not occur.

The use of the adjusted labor income in such cases removes this difficulty and permits the use of a smaller number of farms in each group than would otherwise be permissible. That is, it renders the work more accurate.

It is evident that unless the survey includes several hundred farms it is not advisable to adjust labor income in this manner, because there would be too few farms in each size group to give a reliable average labor income for each group. But when the adjusted labor income has once been obtained, reliable averages can then be obtained from smaller groups of farms than before, for the most important fluctuation in labor income has then been eliminated.

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TABLE I.—*List of productive work units*[1] *per acre of the various crops and per animal unit for the various classes of live stock, for Chester County, Pa. These figures will vary more or less for different localities. The figures used should be based on average local practice.*

	Man.	Horse.
Productive work units per acre of crops:		
Corn for grain	7	6
Corn for silage	6.5	7
Potatoes	10	9
Tobacco	20	7
Wheat, oats, or other grain, oat hay, millet, peas, and other forage	2	3
Hay	1	1
Alfalfa (two cuttings)	3	3
Sweet corn (commercial)	10	9
Truck (commercial)	24	9
Truck (home use)	12	4.5
Fruit (commercial when sales amount to $25 or more per acre)	10	5
Fruit (home use)	5	1
Fruit (not bearing)	2.5	0.5
Productive work units per head of live stock:		
Dairy cows	17	2.5
Dairy cows (pure bred)	20	2.5
20 veal calves	20	1
10 heifers and calves	30	1
10 heifers and calves (pure bred)	40	1
1 bull	7	.....
20 steers (for entire year)	30	1
10 colts or horses (not worked)	60	1
100 breeding ewes	50	3
100 other sheep	40	3
10 brood sows	35	5
50 other hogs	30	5
100 hens or other poultry	18	2
200 chickens or other poultry (raised)	18	2

[1] A work unit is an average day's work.

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Productive work units per $1 of outside labor:	Man.	Horse.
Outside labor, man and team	0.2	0.4
Outside labor, man only	0.4	.....
Outside labor, marketing (man and horse)	0.2⅔	0.2⅔

PRINCIPLES OF TABULATION.

The interpretation of farm management survey data consists in the main of the discovery and measurement of causal relations between the various classes of facts contained in the data. In research work in general such causal relations are studied by producing changes in one class of phenomena and observing the resulting changes in others. In farm management survey data the variations to be studied are already at hand, the problem being to arrange the data in such manner as to display the variations of one factor and then note the variation in others supposed to depend in some way on it.

A farm management survey record consists of the various items constituting an analysis of the farm business. It is the interdependence of these various items that is to be studied. The general problem is to find what relation exists between the magnitude of the various items and the efficiency of the farming. Farm management studies have shown that success in farming depends largely on the following factors: (1) Type of land tenure; (2) type of farming; (3) magnitude of business; and (4) the various factors of efficiency, such as yield per acre, income per cow, adequacy and economy of equipment, diversity of business, productive work units per man and per horse, etc.

In any particular case the problem is to discover the relation of the above factors to success in farming under the conditions which prevail in the locality to which the data relate.

Consideration of a particular case will best serve to show the principles involved in a study of causal relations. The relation between size of farm and labor income may be used for this purpose.

Two methods of procedure present themselves. First, we may arrange the farms in groups according to increasing size of farm and find the corresponding variations in the average labor income

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of each group; or, second, we may arrange them in groups according to ascending labor income and find the corresponding variations in the average size of farm in each of the labor income groups. It is highly important that a proper decision be made as to which of these methods to use. In order to show the difference in the results obtained by the two methods a number of farms are grouped in Table II–A according to size of farm, while in Table II–B the same farms are grouped according to labor income.

TABLE II–A.—*Farms grouped by size, and the resulting average labor incomes determined.*

	Size groups.					
	20–40	41–60	61–80	81–100	101–120	121+
Average labor income.....	$117	$235	$359	$447	$592	$715

TABLE II–B.—*The same farms grouped by labor income, and the resulting average size of farm determined.*

	Labor income groups.						
	−$1,000 to −$501	−$500 to 0	$1 to $500	$501 to $1,000	$1,001 to $1,500	$1,501 to $2,000	$2,001 up.
Average sizes.....	114	56	56	94	107	120	130

Table II–A shows a gradual and regular increase in labor income as size of farm increases. Table II–B, indeed, shows some kind of relation, but the results are plainly distorted by the effect of some other factor or factors. Evidently the relation sought is more clearly and simply portrayed in the first tabulation than in the second. The cause of the difference in results in these two tabulations is at the bottom of all sound reasoning about farm management data. Unless this cause is clearly apprehended serious errors are liable to occur in interpreting such data.

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CAUSE OF THE IRREGULARITY IN TABLE II-B.

Labor income is the combined result of all the factors of success mentioned a few pages back. One of these factors is magnitude of business, in which the size of the farm is an element. Hence, in these two tables we are studying the relation between one of the elements of magnitude of business on the one hand and the combined effect of all the factors of success on the other.

In Table II–A the farms are arranged to display the variations in size of farm; the last line of the table shows the resulting variations in labor income. The question arises whether these variations in labor income are due entirely to variations in size of farm.

We may assume that variation in size of farm causes variations in labor income, but what has become of the influence on labor income of tenure, type of farming, and the various factors of efficiency that the variations in the table should be wholly due to size of farm? Let us study each of these factors separately.

Type of tenure.—Since the type of tenure is more or less related to size of farm, when a number of farms are grouped on size the various forms of tenure do not distribute themselves at random in the various size groups; tenant laborer farms will generally be found in the groups of smaller farms, share tenant farms in the groups of larger farms, etc. Now the form of tenure has some effect on labor income. Hence variations in labor income due to difference in form of tenure are not eliminated, since they are not alike in each size group. In Table II–A this difficulty has been overcome by using only farms of the same type of tenure. This is, in general, the way of getting around this particular difficulty. If desired, a similar study can be made of each type of tenure.

Type of farming.—There is more or less tendency for small farms to be devoted to the more intensive types of farming and large farms to the more extensive. Also, the more intensive the type, the higher the labor income on the average for farms of similar size. Therefore, unless the farms in each group are similar in degree of intensiveness, the difference will tend to make the labor income higher in the groups of small farms and lower in the others. This difficulty was here overcome by using in both these tables only farms of approximately the same type. This would not have been

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necessary if we had been using "cost of operation" instead of "size of farm."

Factors of efficiency.—Let us first consider yield of crops per acre. Previous studies have shown that the average yield per acre of a given crop is just about the same on farms of all sizes. This being the case, both high yields and low yields will occur with about the same relative frequency in all the size groups, so that the average yield will be about the same in each group. Hence the average labor income in the various size groups will not be affected by variation in yield. The effect of such variations is canceled by the law of averages.

Approximately the same is true of all the other factors of efficiency, except in so far as they depend on size of farm, and in the latter case, what influence they have on labor income is in reality due to size of farm. Thus it costs more per acre to equip a small farm than a large one, and this makes the expense of operating a small farm relatively greater than that of a large one. Hence labor income is relatively smaller on small farms than on large ones. But this is just the kind of effects we are trying to measure. Table II–A thus gives a clear presentation of the effect of size of farm on labor income.

In Table II–B the farms are classified according to labor income and averaged on size. Now labor income is the combined effect of many causes. Let us see if the various causes cancel out in the averages as did the effects of these causes in the previous table.

As previously stated, variation in intensiveness of farming was completely eliminated at the outset by considering only farms that were comparable in type, so that we need not consider this factor further. The same is true of difference in form of tenure.

When the farms were grouped by size, factors of efficiency (yield, income per cow, etc.) canceled out, because their effects are proportional to size of farm, and unusual gains and unusual losses were brought together in the same groups. But in Table II–B they are thrown into different classes, because the unusually large gains, which occur only on large farms, are found in the groups of large labor incomes, while the unusually large losses, which are also found only on large farms, are found in the minus

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labor income groups. They thus have no chance to cancel each other. In fact the largest minus labor income group is made up almost wholly of large farms, the average of this group being the third largest in the series. The irregularity in the size averages of Table II–B is thus due to the fact that the basis of sorting did not eliminate all the causes other than the one we were investigating.

It will be noticed that in Table II–A the basis of grouping is a causal factor, that is, variation in size of farms causes a corresponding variation in average labor income; while in Table II–B the basis of grouping is a resultant, or effect, in this case of many causal factors. Grouping on a cause gave a consistent result, because the effects of other causes could be eliminated, while grouping on an effect gave a result that is hard to interpret because influences not under investigation could not be eliminated. This divergence is the usual result of these two methods of grouping. The beginner in farm management investigations should never group his farms on the basis of an effect; the grouping should always be on the basis of a cause, and the averaging is then done on an effect.

When the relation between a cause and the combined effect of several causes, including the one in question, is not complicated by any causal relation of both the cause and the combined effect to some other causal factor, the variation in the averages of the various groups of a tabulation will be due entirely to the variations of the cause under investigation, and the table will display the true effect of this cause.

If the effect under consideration is not the combined effect of two or more causes, but is solely the effect of the one cause under consideration, then it is a matter of no consequence which method of grouping be used—that of Table II–A or that of Table II–B. Suppose, for instance, that size of farm were the sole determining factor in the matter of labor income; in such a case the labor income of every farm would be directly proportional to its size, and grouping on either size of farm or labor income would throw exactly the same farms into each of the groups. But such simple relations are seldom found in farm management survey data.

To show how the influence of one causal factor may sometimes be deduced from the combined effect of this factor and another which can not be separated from it, let us consider the combined

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effect of percentage of intertilled crops and number of animal units per hundred acres of crops on the crop index of a number of farms, as worked out by Mr. D. A. Brodie, of this office, in his study of the relation of farm practice to soil fertility.

Table III shows this relation for a group of farms in Chester County, Pa. A correlation exists here between percentage of intertilled crops and number of animal units per hundred acres of crops, for the reason that the more heavily stocked a farm is in this locality, the larger its percentage of corn area. The live-stock population is thus a causal factor in the percentage area of intertilled crops.

TABLE III.—*Influence of area of intertilled crops and animal units on crop yield in Chester County, Pa.*

Number of farms.	Per cent of cultivated area in intertilled crops.	Average per cent of area in intertilled crops.	Animal units per 100 acres.	Crop index.
72	Less than 25	20.8	37.6	96
58	25–30	27.4	41.2	100
54	30–35	32.7	48.4	105
37	35 and over	41.4	53.4	105

The table shows that as the percentage of intertilled crops increases the crop index increases up to a certain point, but beyond this point there is apparently a falling off. It also shows that the number of animal units per hundred acres of crops increases regularly with increase in percentage of tilled crop area. The farms were here grouped on percentage of intertilled crop area, a resultant factor so far as number of animal units per given area is concerned; but no difficulty is thus introduced for the reason that no other causal relation exists to complicate matters, so that the results are practically the same as if the number of animal units per hundred acres of crops had been used as the basis of classification.

If the number of animals per hundred acres of crops did not continue proportional to percentage of tilled crop area this table would offer no conclusive evidence as to the action of either of these two

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causes separately; but as it is the results appear to be significant. We may assume that the crop index would increase as the amount of manure used increases within very wide limits if no disturbing factor enters. But in this case the maximum yield appears to be reached at a certain point, although the amount of manure used still increases beyond that point.

It is known that summer tillage has some tendency to promote oxidation of organic matter in the soil, and thus to destroy humus and set free nitrates in the soil. The oftener the land is put into a tilled crop the greater this influence should be. Finally we reach a point where oxidation is so rapid as to reduce the amount of organic matter in the soil more rapidly than it is being added, in spite of the fact that more organic matter is added than before, and the crop index thus begins to fall. Unfortunately the variation in percentage of intertilled crops stops just at the point where it would be most interesting to know what the next few terms of the series would be. However, we may tentatively conclude that when the percentage of intertilled land increases beyond about 37 per cent in the locality in question the tillage tends to lower the crop index, while up to that point its influence is not deducible from these data because whatever influence tillage exerts is complicated by the influence of intensity of stocking. Presumably the two influences are similar up to 37 per cent of tilled crop area.

Fortunately, a survey of farms on the black prairie lands of Illinois supplies the missing terms of the series of crop index averages in Table III. The data for the Illinois farms are given in Table IV.

TABLE IV.—*Influence of area of intertilled crops and animal units on crop yield in Marshall silt loam—Illinois.*

Number of farms.	Per cent of cultivated area in corn.	Average per cent.	Animal units per 100 acres.	Crop index.
75	Less than 37.5	28.4	19.3	102
72	37.6–48.9	43.3	18.1	103
82	49–59.9	53.9	17.7	100
74	60 and over	73.6	15.8	93

The small size of the Pennsylvania farms makes rather intensive farming necessary there, so that the large herds of dairy cows kept must be fed mainly from field crops. As corn produces more feed per acre than any other crop commonly grown in that region, the acreage of corn increases as the live stock increase in numbers. In the Illinois locality, on the other hand, the area of corn increases as live stock decrease in numbers, the corn being grown for sale. It is also important to notice that the variation in intensity of stocking is very slight in Illinois in the groups based on tilled crop area, so that difference in the amount of manure available has less influence here than in Table III. In the first two columns of Table IV we find the crop index increasing and the intensity of stocking slightly on the decrease as the tilled crop area increases. Beyond a point between 28.4 and 43.3 per cent of tilled area both decrease as tilled crop area increases. In this case the influence of tillage seems to be more important than that of the animals kept for the crop index increases in spite of decreasing live stock up to the point at which we may assume that tillage becomes excessive, beyond which humus appears to be burned up too fast and the crop index falls off.

Apparently in both these tables the optimum percentage of intertilled crops is about the same, and is in the vicinity of 35 to 40 per cent.

In the above illustration we are able to evaluate the factor of tillage although its results are mixed up with the results of variation in the amount of available manure, for the reasons (1) that the effect of the manure is known in advance and can thus be discounted; (2) the effect of the two factors is not the same throughout the series of averages. The same result could be arrived at by comparing only farms with the same intensity of stocking, but on account of the relation between number of animals and area of corn it would require a very large number of farms to render this possible.

Recapitulation.—In studying the relation between two factors, the variation of one of which is supposed to be a direct cause of variations in the other, the farms should always be grouped on the basis of the *causal* factor and each group averaged on the basis of the *resultant* factor. If each of two factors bears a causal relation

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to a given resultant, while at the same time one of them bears a causal relation to the other, unless the effect of one of them is entirely known it is necessary to devise some means of eliminating the effect of one of them before the effect of the other can be determined. When the number of farms is sufficiently large the effect of one of two related causal factors may sometimes be eliminated by limiting the investigation to farms on which there is little or no variation in that factor. Thus, in studying the relation of size of farm to labor income, the confusing influence of size of farm on intensity of the type of farming may be eliminated by confining the study to types of farming comparable in intensiveness.

CLASSIFICATION BY TENURE.

Before undertaking comparative studies of a group of farms they must be separated into classes in which all farms in each class are comparable. The first separation should be based on tenure, and may include the following classes:

1. Plantations (to be considered elsewhere).
2. Manager farms; those operated by a hired manager.
3. Working owner farms; those operated by owners who take the part of a working manager without salary.
4. Nonworking owner farms; those operated by owners who direct but take no part in the work of the farm.
5. Owner and landlord farms; those, part of which is operated by the owner, the remainder being rented out.
6. Owner and tenant farms; those operated as in (3), but of which the operator owns only part of the land, holding the remainder as a tenant.
7. Cash tenant farms; farms rented for cash and operated by the tenant as a working manager without salary, the working capital being furnished by the tenant.
8. Share tenant farms; those operated as in (7), but with rent consisting of a share of the proceeds.
9. Tenant laborer (or cropper) farms; tenant farms on which the tenant furnishes little or none of the working capital.
10. Combined tenant farms; two or more farms operated by one tenant, but rented from different landlords, or on a different basis.

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The above list is only suggestive. Various modifications of these classes occur. The classification used should conform to the facts concerning the farms to be classified.

In certain kinds of tabulation all the foregoing classes, with the exception of plantations, may be disregarded if each farm is first reduced to the basis of class 3. This may be done as follows:

Class 2. Manager farms. Deduct from expenses, and add to farm income and labor income, the salary of the manager. This applies whether the manager takes part in the farm work or merely directs it.

Class 4. Nonworking owner farms. Deduct from expenses, and add to farm income and labor income, the wages of one man for the part of the year when hired labor is employed.

Class 5. Owner and landlord farms. Eliminate from the investment the portion of the farm rented out, and eliminate from the records all items relating to this portion of the farm. This includes a proportionate share of taxes and other general farm expenses in which the land rented out should share and all receipts from and expenses for this part of the farm.

Classes 6–10. Tenant farms of all kinds. Consider landlord and tenant as one person, and eliminate all transactions between them.

The above reductions are necessary only in tabulations that involve items that would be changed in making the reduction.

TABULATIONS SUGGESTED.

The following list of tabulations is suggested as a means of bringing out the relations between the various elements of farm management survey data and of showing the application of farm management principles to the agriculture of the locality in which the survey is made. The list is merely suggestive; in many cases some of the tables will give no significant result, and often other tabulations will be required.

In addition to the averages noted in the list of tabulations which follow (right-hand column), each tabulation should show:

A. The number of farms in each group (and also in each subgroup if the main groups are further subdivided).

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B. Where the basis of grouping is quantitative (as crop area, number of animal units, etc.) and not qualitative (as types of tenure, type of farming, etc.), the average of each group (and subgroup if any) for the basis of grouping should be given. Thus, if the farms are divided into groups based on number of animal units per 100 acres of crop, the average number of animal units per 100 acres of crops in each group should be given.

C. A summary of all the columns or lines, as the case may be (both columns and lines if each group is divided into subgroups).

In dividing farms into groups on the basis of a quantitative factor, as crop area, percentage of income from poultry, etc., where possible make the size limits of the various groups such as to give a sufficient number of farms in each group to give a reliable average, at least in most of the groups (all groups if practicable to do so).

When the farms have been sorted on any factor, the calculations should be made for all the tables requiring this same sorting. The various groupings to be made, with the numbers of the tabulations (see pp. 30 to 40) required in each, are as follows:

1. Tabulations requiring no sorting into groups: V,[1] XIII,[1] XXXI, LXXI, LXXIII, LXXIV, LXXV.
2. Types of tenure: I, III, IV, VI, VII, XIV, XX, XXI, XXIII, XXIV, LXI, LXVII, LXIX.
3. Size of farm: II.
4. Crop area equivalent: VIII, IX, XV, XXII, XXV, XXVI, XXXVI, XXXVII, XXXVIII, XXXIX, XL, XLI, XLII, XLV, XLVI, XLVII, XLVIII, XLIX, LVI, LXII, LXVIII.
5. Types of farming: X, XI, XVII, XVIII, XXXII, XXXIV, L, LI, LII, LIII, LXVI, LXX.
6. Percentage of crop area devoted to each crop: XII, XXVII.
7. Percentage of animal units of each kind: XIX.
8. Percentage of receipts from each source: XXVIII.
9. Types of dairying—exclusive: XXIX.
10. Types of dairying—inclusive: XXX.
11. Crop acres per animal unit: XXXIII.

[1] Tabulations V and XIII may be made by summarizing the results of other tabulations, as noted later.

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12. Magnitude of business: XXXV.
13. Productive work units per man: XLIII, LX.
14. Crop area per farm: XLIV.
15. Animal units per 100 acres of crops: XVI, LIV, LXXII.
16. Percentage of intertilled crops: LV.
17. Crop index: LVII, LIX.
18. Income per cow: LVIII.
19. Diversity index: LXIII.
20. Percentage of receipts from crops: LXIV.
21. Rotations followed: LXV.

Tabulations designed to bring out the significant relations in farm management survey data.

	Tabulation No.	Basis of grouping.	Basis of averages.
PRELIMINARY TABULATIONS.	I	Types of tenure...	Size of farms, tillable area, crop area, tillable pasture area, other pasture area, woodland, waste land, value of real estate per acre, per cent of crop and pasture area in pasture.
	II	Size of farms.....	Same as in Table I.
	III	Types of tenure...	Labor income and adjusted labor income of farm as a whole; of tenant; per cent over $1,000. (For farm as a whole, reduce to basis of working owner.)
	IV	.....do.....	Owner farms; per cent of income on investment (see calculation 46, p. 11). Tenant farms; landlord's per cent income on investment; tenant's per cent income on investment. (See calculation 47, p. 11.)

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Tabulations designed to bring out the significant relations in farm management survey data—Continued.

	Tabulation No.	Basis of grouping.	Basis of averages.
TYPES OF FARMING.	V	Farms of all sizes and tenures; no division into groups.	Per cent of total crop area devoted to each crop. This may be obtained by summarizing Table VI or Table VII. Similar data from recent censuses to show whether the survey data is representative of the country as a whole and whether each crop is gaining or losing in importance or merely holding its own.
	VI	Types of tenure...	Acres of each crop and of pasture; per farm reporting and per farm, all farms.
	VII	.....do.....	Percentage of crop area devoted to each crop, per farm reporting, per farm, all farms. Percentage pasture area is of crop and pasture area.
	VIII	Magnitude of business.	Same as in VI.
	IX	.....do.....	Same as in VII.
Crops.....	X	Types of farming, if there are marked differences in type.	Acres of each crop per farm.
	XI	.....do.....	Percentage of crop area devoted to each crop.
	XII	Percentage of crop area devoted to each crop. Regroup for each crop and devote one line of table to each crop. Make percentage classes of suitable size to display true character of variation in percentage area of each crop. Unimportant crops require small percentage classes.	Number of farms in each percentage group. This may also be displayed in a dot chart, each dot representing the percentage of area devoted to a particular crop on one farm. This table (or chart) shows the variations in percentage area of each crop. It may be confined to only one or two leading types of tenure. Summary columns should be given showing number of farms having 1–100, 20–100, and 40–100 per cent of their area devoted to each crop.

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Tabulations designed to bring out the significant relations in farm management survey data—Continued.

	Tabulation No.	Basis of grouping.	Basis of averages.
TYPES OF FARMING—contd.	XIII	Farms of all sizes and tenures; no division into groups.	Number of animals of each class per farm; same reduced to animal units; the latter reduced to percentage of total animal units per farm; similar census data (number of animals only) from several recent censuses; may be obtained by summarizing Table XIV.
	XIV	Types of tenure...	Same as first three columns of XIII.
	XV	Magnitude of business.	Percentage of animal units for each kind of animal; this may also be shown by dot chart. (See XII.)
Live stock.....	XVI	Animal units per 100 acres of crops.	Percentage area of each crop; also percentage of crop and pasture area in pasture.
	XVII	Type of farming, if of importance.	Number of animals of each kind per farm.
	XVIII	.....do.....	Percentage of animal units of each kind per farm.
	XIX	Percentage of animal units of each kind in total per farm. (See XII.)	Number of farms in each percentage group.
	XX	Types of tenure...	Crop acres and pasture acres per animal unit.
	XXI	.....do.....	Crop acres and pasture acres per dairy cow.
	XXII	Magnitude of business.	Number of animal units of each kind per 100 acres of crops per farm.
Sources of income.	XXIII	Types of tenure...	Actual income from each enterprise per farm.
	XXIV	.....do.....	Percentage of income from each enterprise (and census data).
	XXV	Magnitude of business.	Same as XXIII. May tabulate each tenure separately or all together or only leading tenure. Graph for all sizes.
	XXVI	.....do.....	Same as XXIV. (See note on tenure under XXV.)
	[1] XXVII	Percentage of crop area devoted to corn. (Use only farms of comparable types of farming.)	Labor income and adjusted labor income. If different tenures are used, reduce to bases of working owners.

[1] Prepare tables like XXVII for each crop, and like XXVIII for each source of income.

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Tabulations designed to bring out the significant relations in farm management survey data—Continued.

	Tabulation No.	Basis of grouping.	Basis of averages.
TYPES OF FARMING—contd.	[1] XXVIII	Percentage of receipts from sale of corn. (See XXVII.)	Same as XXVII.
	XXIX	Types of dairying, each group to consist only of farms selling only the one one dairy product.	Size of farm; distance to market point; number of cows; labor income and adjusted labor income. Percentage of total dairy farms in each group.
	XXX	Types of dairying, each group to consist of all farms selling a given product. This will throw some farms into more than one class.	Same as in last. (In this table the per cents will usually add up over 100 because some farms occur in 2 or more groups.)
	XXXI	List of enterprises, with conditions favorable and unfavorable to each.	(See Table XXV, Dept. Bul. 341.)
Sources of income	XXXII	Type of farming. (Use only farms of same tenure in one table. If several tenures are important, tabulate each separately.)	Size of farm.
	XXXIII	Crop acres per animal unit (all kinds together). Subdivide each group on basis of percentage of dairy cows in total animal units. Run primary groups at left margin; secondary as column headings.	Percentage of productive work units on crops.
	XXXIV	Type of farming...	Same as XXXIII.

[1] Prepare tables like XXVII for each crop, and like XXVIII for each source of income.

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Tabulations designed to bring out the significant relations in farm management survey data—Continued.

	Tabulation No.	Basis of grouping.	Basis of averages.
MAGNITUDE OF BUSINESS. (See Preliminary calculation No. 65.)	XXXV	Magnitude of business.	Labor income. (If different tenures are combined, reduce all to basis of working owners.) Graph—Magnitude as horizontal measure, labor income vertical measure; this graph is a line or curve, rising as magnitude increases. (See fig. 4, Dept. Bul. No. 41.) Graph—Showing labor income of each farm, the farms arranged in order according to magnitude of business. (See fig. 9, Dept. Bul. 341.)
	XXXVI	.....do.....	Productive man work units; crop acres per man; same per work horse; cost of total man labor per crop acre; monthly wages; work horses per man; value of machinery per crop acre.
	XXXVII	Magnitude of business. Subdivided by tenure.	Two columns for each tenure; one for cost of dwelling and the other for cost of other farm buildings.
	XXXVIII	Magnitude of business; using only working owners.	Same as XXXVII, expressing cost in terms of farm income.
	XXXIX	Magnitude of business; using only cash tenants.	Same as XXXVII, expressing cost in terms of tenants' farm income.
	XL	Magnitude of business; using only share tenants with working capital.	Do.
	XLI	Magnitude of business; using only tenant laborers (croppers).	Do.
	XLII	Magnitude of business.	Cost of depreciation, interest, and repairs on buildings, fences, and machinery; totals per farm and per crop acre.
	XLIII	Number of productive work units (man) per farm.	Labor income. Graph for same. (See XXV.)
	XLIV	Crop area per farm.	Give percentage of farms in each size group (based on crop area) owning each of principal items of field machinery. Use list of items as left margin; crop area groups as column headings.

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Tabulations designed to bring out the significant relations in farm management survey data—Continued.

	Tabulation No.	Basis of grouping.	Basis of averages.
MAGNITUDE OF BUSINESS—con.	XLV	Magnitude of business. (Use working owner farms, or other leading tenure, as basis of grouping on size. Other tenures may be added without grouping on size).	Capital, in dollars; percentage of capital invested in land, dwelling, other buildings, implements and machinery, live stock, feed, and supplies, and cash to run the farm; percentage of working capital; working capital per acre of crop area equivalent.
	XLVI	Magnitude of business (cash tenants only).	Percentage of income on landlord's capital.
	XLVII	Magnitude of business; using share tenants with working capital.	Do.
	XLVIII	Magnitude of business; using tenant laborers (croppers).	Do.
	XLIX	Magnitude of business.	Percentage of farms of each tenure in each size group.
	L	Type of farming, subdivided on magnitude of business.	Labor income. This tabulation is not feasible unless large numbers of farms are available. With smaller numbers, omit the subdivisions on size and use labor income adjusted for magnitude of business.
	LI	.....do.....	Total capital.
	LII	.....do.....	Working capital per acre.
	LIII	.....do.....	Total labor.
QUALITY OF BUSINESS.	LIV	Intensity of stocking (animal units per 100 acres of crops. If percentage of pasture area is highly variable, use crop area equivalent).	Crop index; yield per acre of each crop.
	LV	Percentage of intertilled crops.	Do.
	LVI	Magnitude of business.	Do.
	LVII	Crop index.....	Labor income. (Use adjusted labor income if number of farms is small.)
	LVIII	Income per cow...	Do.

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Tabulations designed to bring out the significant relations in farm management survey data—Continued.

	Tabulation No.	Basis of grouping.	Basis of averages.
QUALITY OF BUSINESS—contd.	LIX	Crop index; subdivide on income per cow.	Labor income. (Use adjusted labor incomes if number of farms is small.)
	LX	Productive work units per man.	Size of farm; productive work units per horse; labor income; adjusted labor income; receipts per cow; wages of operator per day (labor income divided by productive work units per man); labor income per day for 300-day year (labor income divided by 300).
	LXI	Types of tenure...	Yield per acre, each crop; crop index.
FARM ORGANIZATION.	LXII	Magnitude of business.	Diversity index.
	LXIII	Diversity index...	Labor income; adjusted labor income.
	LXIV	Percentage of receipts from crops.	Do.
	LXV	Tabulate the principal rotations, record number of farms using each, average size of these farms, and numbers of animal units of each kind per 100 acres of crops.	
	LXVI	Types of farming..	Percentage of receipts required for operating expenses.
	LXVII	Types of tenure...	Do.
	LXVIII	Magnitude of business.	Percentage of expenses for each item of expense.
	LXIX	Types of tenure...	Do.
	LXX	Types of farming..	Do.
	LXXI	Cost of feed per animal unit and income per animal unit other than work horses. (See Table V, attached, for illustration.)	
	LXXII	Value of manure per animal unit. (See Table VI, attached, for illustration.)	
	LXXIII	Acres of feedable crops and of pasture per animal unit. (See Table VII, attached, for illustration.	
	LXXIV	Rate of depreciation of dairy cows. (See Table VIII, attached, for illustration.)	
	LXXV	Rate of depreciation of farm work horses. (See Table IX, attached, for illustration.)	

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MODELS FOR TABULATIONS LXXI TO LXXV.

TABLE V (Tabulation LXXI).—*Feed cost per animal unit on 378 farms operated by owners; Chester County, Pa.*

	Amount raised.	Amount sold.	Amount consumed.	Price.	Value of feed consumed.
	Bushels.	*Bushels.*	*Bushels.*	*Bushel.*	
Corn for grain and other	265,313	25,788	239,525	$0.75	$179,644
	Tons.	*Tons.*	*Tons.*	*Ton.*	
Silage	6,678	.....	6,678	4.00	26,712
Hay	12,481	5,642	6,839	18.00	123,102
	Bushels.	*Bushels.*	*Bushels.*	*Bushel.*	
Oats	54,360	2,725	51,635	0.50	25,818
Rye	224	52	172	.80	138
Barley	229	.....	229	.75	172
Oats and speltz	160	.....	160	.60	96
	Tons.	*Tons.*	*Tons.*	*Ton.*	
Straw [1]	5,000	900	4,100	4.00	16,400
Stover [1]	6,000	.....	6,000	5.00	30,000

[1] Yield estimated.

Total value of farm feed	$402,082.00
Increase in inventory value	36,061.00
Total value of farm feed consumed	366,021.00
Total value of farm feed consumed per animal unit	49.79
Value of feed purchased	74,304.00
Value of feed purchased per animal unit	10.11
Total feed cost	440,325.00
Total feed cost per animal unit	59.90

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TABLE VI (Tabulation LXXII).—*Value of manure per animal unit determined by comparing two groups of Chester County, Pa., farms.*

[The first group contains 94 farms (one-fourth of entire number) having the least number of animal units per 100 acres of crops (average, 20.36). The second group includes 94 farms having the highest numbe: of animal units per 100 acres of crops (average, 56.85). Difference, 36.49 animal units—378 owner farms, Chester County, Pa.]

Crops.	Corn.	Potatoes.	Wheat.	Oats.	Hay.
Acres per 100 acres of crops [1]	22.00	6.21	18.8	6.6	45.4
Average yield per acre (bushels or tons):					
Lowest group, 94 farms	50.96	79.18	22.90	37.86	1.22
Highest group, 94 farms	71.83	83.09	25.56	43.67	1.55
Increase in yield per acre (bushels or tons)	11.85	3.91	1.66	5.81	.33
Increase in production per 100 acres of crops (bushels or tons)	272.55	24.24	31.21	38.35	14.98
Prices [1]	$0.80	$1.04	$0.92	$0.55	$22.12
Value of increased production per 100 acres of crops	$218.04	$25.21	$28.71	$21.09	$331.36

[1] Areas and prices are the averages for the entire 378 farms operated by their owners. These are used in order to eliminate factors other than the quantity of manure available. The crop areas given here are per 100 acres of the five crops mentioned.

Total of last line	624.41
Excess of fertilizer used by second group, per 100 acres of all crops	48.00
Increase due to 36.49 animal units	576.41
Increase due to one animal unit	15.80

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TABLE VII (Tabulation LXIII).—*Acres of feedable crops and pasture per animal unit—378 owner farms, Chester County, Pa.*

Acreage of farms.	40 or less.	41–60	61–80	81–100	101–120	121–160	Over 160.	All farms.
Number of farms	54	61	60	68	52	61	23	378
Number of animal units per farm	7.6	12.5	16.6	20.2	24.4	26.7	41.8	19.4
	Per animal unit.							
Corn for grain, Corn for silage, Other corn	0.60	0.59	0.60	0.62	0.63	0.62	0.63	0.62
Oats and other grains for feed	.13	.14	.18	.20	.17	.19	.22	.18
All hay	.99	1.05	1.22	1.26	1.15	1.40	1.26	1.23
Total feed crops	1.72	1.78	2.00	2.08	1.95	2.21	2.16	2.03
Pasture[1]	.88	1.08	1.10	1.08	1.23	1.27	1.41	1.18
Grand total	2.60	2.86	3.10	3.16	3.18	3.48	3.57	3.21
Value of farm feeds sold	$13.43	$15.37	$20.55	$20.80	$17.94	$25.41	$30.25	$21.08
Value of feed purchased	12.75	8.85	9.61	9.36	11.10	8.34	13.37	10.11

[1] Does not include work horses.

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TABLE VIII (Tabulation LXXIV).—*Showing depreciation of dairy cows—378 farms operated by owners, Pennsylvania.*

	Number.	Value per head.	Total value.
First inventory	4,196	$56.10	$235,400
Cows purchased	589	63.84	37,605
Cows raised	345	63.84	22,025
Total			295,030
Second inventory	4,164	57.01	237,430
Cows sold and slaughtered	895	37.36	33,437
Total			270,867
Difference			24,163
Increase at end of year in value		.91	3,789
Total loss			27,952
Average investment			236,415
Rate of depreciation.....per cent			11.82

TABLE IX (Tabulation LXXV).—*Showing depreciation of horses—378 farms operated by owners, Chester County, Pa.*

	Number.	Value per head.	Total value.
Value at first inventory	1,369	$135.98	$186,183
Value of horses purchased	103	157.36	16,208
Value of horses raised	8	157.36	1,259
Total			203,650
Value at second inventory	1,367	138.95	189,947
Value of horses sold	64	128.02	8,193
Total			198,140
Loss			5,510
Increase in price during year		2.97	4,060
Total loss			9,570
Average investment			188,065
Rate of depreciation.....per cent			5.09

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Farm Management Office

F. M. Circ. 2. Issued June 5, 1917.

United States Department of Agriculture,
OFFICE OF THE SECRETARY.

Contribution from the Office of Farm Management,
W. J. SPILLMAN, Chief.

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PLAN FOR HANDLING THE FARM-LABOR PROBLEM

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OUTLINE OF PLAN.

The plan of operation here outlined is given in generalized form. In case this plan, or a modification of it is adopted, the State man placed in charge of the work should at once proceed to make any changes needed to fit the plan to conditions in the State and then have copies printed sufficient in number to supply the needs of the State. It is not the intention to substitute this for any satisfactory plan already formulated or in operation.

This plan, which is presented for whatever suggestive value it may have, contemplates a State organization, a separate county organization or a representative for each county, and a local organization or representative for each community for dealing with the problem of farm labor. State organizations are assumed to be responsible for the organization or selection of representatives in the counties, and the county organizations for the organization or selection of representatives in the various communities in the county. Each organization is supposed to designate some one individual to be responsible for the details of its work in connection with matters relating to farm labor, and these individuals are herein referred to, respectively, as State man, county man, and community man.

Two important features of the plan are:

1. It provides for ascertaining the needs of every farmer, not only as to the number of additional laborers needed, but as to the time when they are wanted. It will be impossible to shift labor from one locality to another satisfactorily without this information. This is especially important in connection with harvest labor.

2. It avoids the congestion of data in any one office. *In the plan here presented each unit acts as a clearing house for its territory, reporting to the units higher up only surpluses or deficits.* The needs of the farmer thus begin to be met as soon as the plan is put into operation.

SUGGESTED SOURCES OF LABOR.

Special effort should be made to list all available labor in rural and village communities and in schools in such communities, including agricultural schools and colleges wherever located.

Some of the classes amongst which recruits may be found in all rural and village communities are enumerated in the following paragraphs:

There are about 700,000 retired farmers in this country not now occupied. Many of these who are able-bodied undoubtedly will help

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in the present emergency. Their knowledge of farming makes them a very important factor.

There are several million boys and young men not now engaged in farm work but who have had more or less farm experience. Such of these as are found in the large cities may be enrolled by the United States Department of Labor. In rural communities, villages, and the smaller towns they should, as far as possible, be enrolled for farm work by the organization outlined in these pages.

In villages and small towns many people who have had farm experience can be spared for farm work during busy seasons on the farm.

Where the shortage of labor is serious and can not otherwise be met, women and girls will doubtless volunteer in large numbers to meet emergencies—in many cases taking the places of men who will thus be released for farm work.

Many school and college authorities have shown a desire to assist by rearranging their schedules and by excusing students for farm work with academic credit.

Recruiting stations report the rejection of numerous applicants for one reason or another. Many of these applicants may be available for farm labor, and this source of labor should not be overlooked.

Nearly everyone takes a vacation at some time during the year. People generally, more especially those who know how to do farm work, may be willing to take their vacations at times when they can be helpful on the farm.

In the matter of exchange labor between farmers, where farmers help each other at certain tasks, such as harvesting, thrashing, haying, etc., it is believed that no particular attempt should be made to record the need or supply of such exchange labor on the blanks, leaving individual farmers to make their own arrangements with their neighbors. However, farmers should be urged to cooperate freely in exchanging labor. Where a farmer has labor which he knows will not be needed at some particular time of the year, either on his own farm or in exchange labor with his neighbors, such labor should be listed for the time it will be available for others.

The Federal Department of Labor has special facilities for obtaining labor from many of the above sources, especially in the larger industrial centers, and from others. Where farm-labor needs can not be met by supplies obtained from rural and village communities and the smaller towns, the Department of Labor will undertake to supply them on definite notice of the number of laborers needed and when and where needed. Such notice should be given as early as possible.

State, county, and community men in this organization should keep in constant touch with local representatives of the employment service of the Department of Labor and utilize their facilities as

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fully as may be necessary.[1] It is important, however, that when arrangements have been made for obtaining labor in this manner, the deficit thus met should not be reported as a deficit to the next higher unit in this organization. Thus, if a county man arranges to meet a county deficit wholly with labor supplied by the employment service of the Department of Labor, he should not report the same deficit to his State man.

Since the labor survey herein provided for may take some time other efforts to supply farm labor should not be discouraged. Representatives of this organization should at least work in harmony with other agencies for supplying farm labor.

Certain daily papers in the large cities have listed large numbers of men who desire employment on farms. Many of these men are experienced farm hands. Where such lists are available they should be used.

DETAILS OF THE PLAN.

Those responsible for the organization of farm labor within a State should designate some one person of known ability as an organizer or executive and with an intimate knowledge of farming to have charge of carrying out the details of this plan. Wherever desired the State farm-help specialist representing the United States Department of Agriculture may be utilized in this capacity. Where some one else is in charge of the work, the State farm-help specialist representing this department may be assigned to assist in the work. The plan herewith presented assumes that the State will be divided into subdivisions, each of which represents a single county or convenient group of counties. This outline as here presented assumes the county as the subdivision of the State for dealing with the farm-labor problem. The plan also assumes that in each county there will be some one person responsible to the State man in charge of the work to carry out the details of the plan in his county.

---

[1] The Department of Labor has branch offices as follows:

Massachusetts, Rhode Island, Maine.—1151 Washington Street, Boston, Mass.

New York, New Hampshire, Vermont, Connecticut.—Room 8, U. S. Barge Office, New York, N.Y.

New Jersey.—207 Market Street, Newark, N. J.

Pennsylvania, Delaware, West Virginia.—132 South Third Street, Philadelphia, Pa.

Maryland.—Stewart Building, Baltimore, Md.

Virginia, North Carolina.—119 West Main Street, Norfolk, Va.

Florida, Georgia, Alabama, South Carolina.—Federal Building, Jacksonville, Fla.

Louisiana, Mississippi, Arkansas, Tennessee.—City Hall, New Orleans, La.

Texas, New Mexico.—American National Insurance Co. Building, Galveston, Tex.

Ohio, Kentucky.—Post Office Building, Cleveland, Ohio.

Illinois, Indiana, Michigan, Wisconsin.—845 South Wabash Avenue, Chicago, Ill.

Minnesota, North Dakota, South Dakota.—Federal Building, Minneapolis, Minn.

Missouri.—804 Grand Avenue, Kansas City, Mo.

Kansas, Oklahoma, Iowa, Nebraska.—19 Eighth Street, St. Louis, Mo.

Colorado, Wyoming, Nebraska, Utah.—355 Federal Building, Denver, Colo.

Montana, Idaho.—Power Building, Helena, Mont.

Washington.—Union and Western Avenues, Seattle, Wash.

Oregon.—Railway Exchange Building, Portland, Oreg.

Northern California, Nevada.—Room 2 United States Appraisers' Building, San Francisco, Cal.

Southern California, Arizona.—Post Office Building, Los Angeles, Cal.

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It is presumed that under the State extension director, county demonstrators or agents will, in many of the States, act as county men in this organization. In others the responsibility will probably rest upon a county committee, and the county man in this case would be some one designated by the committee. It is believed that commercial clubs and banks will freely cooperate.

The plan assumes that the county or other primary division of the State will be divided into a convenient number of "communities," each with its community man working under the direction of the county man. The county and community men are assumed to appoint such committees as may be necessary in carrying out the duties devolving upon them.

In counties not organized for the work and having no plans made for immediate organization, a method of procedure such as the following might be adopted: Have the State agency designate an individual in each unorganized county to call a meeting of farmers and other business men at the courthouse or other convenient place, the State agency designating the day and hour of the meeting. This meeting should—

(1) Designate some suitable individual to be responsible for the work in the county.

(2) The meeting should also designate some suitable person in each community of the county (perhaps at each market point in the county) to be responsible for the work in the respective communities. Each county and community man should appoint such committees as he will need in carrying on his work.

By the time the meeting occurs, printed copies of the plan of operation should be on hand to distribute to the newly chosen county man and each of the community men.

Each community man, with such assistance as is necessary, proceeds at once to ascertain the labor needs of every farmer in his community, using Form 1 (see p. 11) for this purpose, one blank for each farmer.

In similar manner he uses Form 2 in enrolling every individual volunteering for the agricultural service. Those already engaged in farm labor should be included *only for such times as they will be available for work on other farms.* It should also include those in villages and towns who can devote any portion of the season to farm work.

When Forms 1 and 2 have been filled out, the community man makes such assignments as will adjust local supplies of labor to local needs, using Form 3 for this purpose. When the community man has assigned a laborer to a farmer, it is his duty to notify both the laborer and the farmer of the assignment, giving each of them all the information necessary to bring them together. If he is

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unable in this way to supply every farmer, he uses Form 4 in reporting the deficit to his county man. If, on the other hand, he has a surplus of labor available, it is reported to the county man on Form 5.

The community man should send to his county man supplemental reports from time to time when changes in the labor situation demand further adjustment which he can not meet with the supplies of labor available to him or when a surplus of labor develops which he can not use.

The county man, as Forms 4 and 5 come in, uses Form 6 for making transfers of labor from one community to another. In making such transfers the county man should proceed as follows:

(1) Notify the community man furnishing the surplus as to the number of men to be sent, the name and address of the community man to whom they are to report, and the date when they should report.

(2) Notify the community man to whom the men are to be sent as to the number to be sent, where they are from, and when they will arrive. The community man will notify the farmers when and where to meet the men.

When the county man has thus adjusted his communities, he will usually have a surplus or a deficit for the county as a whole. If there is a deficit he reports it to the State man on Form 7; if a surplus, on Form 8. The county man should similarly send supplemental reports to the State man as occasion demands.

As Forms 7 and 8 come into the office of the State man he uses Form 9 in recording transfers of surpluses to meet deficits as between counties. In transferring men from one county to another the State man should proceed as follows:

1. Ascertain from the county man needing labor the points where the laborers should report, the name of the community leaders to whom they should report, and how many should report at each point.

2. Notify the county man furnishing the labor as to the points to which to send men, when to send them, how many to send to each point, and the name of the community leader to whom they are to report. The county man notifies his community men when, where, and how many men to send. The community man notifies the individuals to be sent.

3. Notify the county man receiving the labor as to the number of men being sent to each point and when they will arrive. The county man notifies the community men when and where the laborers will arrive and the number coming. The community man notifies the farmers when and where to meet the laborers.

If a deficit is found for the State as a whole, the details of the deficit should be reported to the Office of Farm Management, by counties, on Form 10. If a surplus, report on Form 11. If some of the

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counties having a surplus and some of those having a deficit are so far distant as to render it more practicable to meet the situation by transfers to or from adjacent States, such surpluses and deficits should both be reported. The Office of Farm Management will act as a clearing house between the States.

NOTES.

Transportation.—The transportation of labor from point to point must be taken care of locally. In some cases doubtless concessions from the railroads will be secured. For transporting labor short distances local people will doubtless make autos available.

Volunteers from other States.—If offers of service come from individuals or groups in other States enroll them the same as those volunteering in the State *if they are needed.* Notify them of action taken.

Printing blanks.—Each State should print its own supply of blanks. Much time can be saved by having each county print Forms 1 and 2 sufficient for its needs.

Government agencies.—The survey here outlined is suggested by the United States Department of Agriculture cooperating with the United States Department of Labor.

Wages.—The farmer who pays the wages and the laborer who works for them determine what the wages are to be.

Help in the farm home.—The need and the supply of help for the farm home may be handled along with and on the same blank as that for ordinary farm labor.

Expenses.—The department will where necessary pay the salary and expenses of a representative in each State.

Forms 1, 2, 3, 4, and 5 are suggested for the use of community men in:

1. Getting records from farmers of help wanted.
2. Getting lists of extra help available for farm work.
3. Assigning extra farm help to farmers.
4. Reporting to the county man community shortages of farm help wanted.
5. Reporting to county men surpluses of extra farm help available for distribution elsewhere.

Forms 6, 7, and 8 are suggested for the use of county men in:

6. Assigning extra helpers to community men.
7. Reporting to the State man shortages of farm help wanted in the counties.
8. Reporting to the State man county surpluses of extra help available for distribution in other counties.

Forms 9, 10, and 11. Suggested for the use of the State man in:

9. Assigning extra farm help to counties reporting a shortage.
10. Reporting by counties shortages of farm help wanted in the States.

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11. Reporting by counties surpluses of extra farm help available for distribution in other States.

The following quantities of these form labor blanks will be needed for carrying out the work as planned:

Form 1. Sufficient for every farmer.

Form 2. One fourth as many as of Form 1.

Forms 3 to 5. 100 for each community man.

Form 6 to 8. 100 for each county man.

Forms 9 to 11. 100 for each State man.

It is suggested that these forms be printed on sheets about 8 by 10½ inches in size. To expedite matters, it is suggested that forms 1 and 2, which are necessary in beginning the work, be printed by the county.

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Farm help Form 1.—Farm help wanted.

.....,.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*Farmer.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

FARM HELP WANTED.

When and how long wanted.	Men, number.	Women, number.	Boys, number.	Girls, number.	Kind of work to be done.	Wages offered.	Check here those supplied.
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This form to be filled out by the farmer wanting help not already provided for. When filled out, this record should be given to the community man and retained by him until the end of the season, when it should be sent to the county man.

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Farm help Form 2.—Extra help available for farm work.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*Coumunity man.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

EXTRA HELP AVAILABLE FOR FARM WORK.

Name and address.	Man, woman, boy, girl.[1]	When and how long available?	What work can you do?	What wages do you expect?	How far will you go for work?	Check those assigned here.
Name: ..... Address:						
Name: ..... Address:						
Name: ..... Address:						
Name: ..... Address:						
Name: ..... Address:						
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Name: ..... Address:						

[1] Those 16 and over should be listed as men and women.

This form to be filled out by the community man and retained by him until the end of the season, when he should send it to the county man.

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Farm help Form 3.—Assignment record for community man.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*Community man.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

ASSIGNMENT OF FARM HELPERS.

Names of helpers assigned.	When and for how long assigned.	Names of farmers to whom assigned.
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When a helper listed on Form 2 is assigned to a farmer listed on Form 1, a record of the assignment should be made on this form (Form 3). This form should be retained by the community man till end of season, when it should be sent to the county man.

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Farm help Form 4.—Community shortage of farm help as shown by Forms 1, 2, and 3.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*Community man.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

FARM HELP WANTED.

When and how long wanted.	Men, number.	Women, number.	Boys, number.	Girls, number.	Kind of work to be done.	Wages offered.	Check here those supplied.
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The community man should check off and balance his records on Form 1 (Farm help wanted), and Form 2 (Extra help available for farm work), and enter any shortage of farm help wanted in the community on this form and send it to the county man or other leader in charge of the work in the county.

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Farm help Form 5.—Community surplus of farm help as shown by Forms 1, 2, and 3.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*Community man.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

SURPLUS OF EXTRA HELP AVAILABLE FOR FARM WORK IN OTHER COMMUNITIES.

When and for how long available.	Men, number.	Women, number.	Boys, number.	Girls, number.	Kind of work can do.	Wages expected.	How far will go for work.	Check those assigned here.

The community man should check off and balance his records on Form 1 (Farm help wanted), and Form 2 (Extra help available for farm work), and enter his surplus of extra help on this sheet and send it immediately to the county man in charge of the work in the county.

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Farm help Form 6.—Farm help assignment record for county agent.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*County man.*)

Date .....

Mr. ..... **P. O.** ..... **County** ..... **State** .....

When and for how long assigned.	Men, Number.	Women, Number.	Boys, Number.	Girls, Number.	Community men furnishing help.	Assigned to (name of community men).
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Farm help Form 7.—County shortage of farm help wanted.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*County man.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

FARM HELP WANTED BY ..... COUNTY OVER AND ABOVE LOCAL SUPPLY AVAILABLE.

When and how long wanted.	Men.	Women.	Boys.	Girls.	Kind of work to be done.	Wages offered.	Check here those supplied.
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The county man should check off and balance his community mens' records on Forms 4 and 5 and record on this sheet the net shortage for the county, if any, and send it immediately to the State farm help specialist.

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Farm help Form 8.—County surplus of farm help.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*County man.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

EXTRA FARM HELP IN ..... COUNTY AVAILABLE FOR DISTRIBUTION IN OTHER COUNTIES.

When and for how long available.	Men, number.	Women, number.	Boys, number.	Girls, number.	Kind of work can do.	Wages expected.	How far will go for work.	Check those assigned here.
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County man should check up and balance his community men's records on Forms 4 and 5 and record on this sheet any balances of extra help available for distribution to other counties and send it immediately to State farm help specialist.

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Farm help Form 9.—Farm help assignment for State farm help specialist.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*State man.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

ASSIGNMENT OF EXTRA FARM HELPERS TO COUNTY.

When and for how long assigned.	Men, number.	Women, number.	Boys, number.	Girls, number.	County furnishing help.	Assigned to (name of county).

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Farm help Form 10.—State shortage of farm help wanted.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*State man.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

FARM HELP WANTED BY.....COUNTY, STATE OF.....OVER AND ABOVE LOCAL SUPPLY AVAILABLE.

When and how long wanted.	Men, number.	Women, number.	Boys, number.	Girls, number.	Kind of work to be done.	Wages offered.	Check here those supplied.
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The State farm help specialist should check off and balance the county mens' records on Form 7 and 8 and record on this sheet the net shortage by counties for the State, if any, and send it immediately to the Office of Farm Management, United States Department of Agriculture, Washington, D. C.

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Farm help Form 11.—State surplus of farm help.

.....

(Name of State agency handling the work.)

In cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE.

(*State man.*)

Date .....

Mr. ..... P. O. ..... County ..... State .....

EXTRA FARM HELP IN ..... COUNTY, STATE OF ....., AVAILABLE FOR DISTRIBUTION IN OTHER STATES.

When and for how long available.	Men, number.	Women, number.	Boys, number.	Girls, number.	Kind of work can do.	Wages expected.	How far will go for work.	Check those assigned here.

The State farm help specialist should check off and balance the county mens' records, Form 7 and 8 and record on this sheet by counties any balances of extra help available for distribution in other States and send immediately to the Office of Farm Management, United States Department of Agriculture, Washington, D. C.

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F. M. Circ. 3. Issued February 24, 1919.

United States Department of Agriculture,
Office of the Secretary

Contribution from the Office of Farm Management,
R. L. ADAMS, Acting Chief.

A METHOD OF TESTING FARMS IN THE SOUTH FOR EFFICIENCY IN MANAGEMENT.

By

C. L. GOODRICH,
Agriculturist.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1919.

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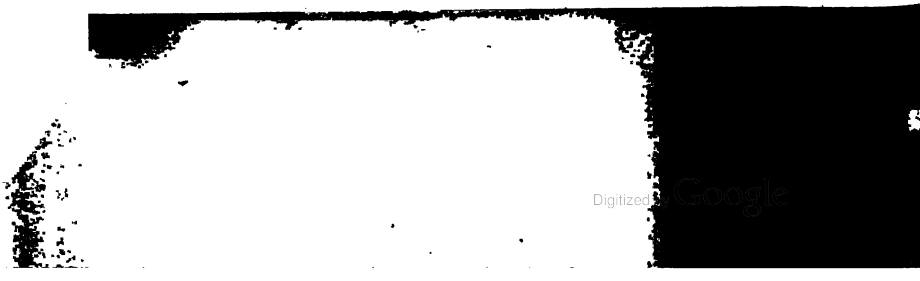
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A METHOD OF TESTING FARMS IN THE SOUTH FOR EFFICIENCY IN MANAGEMENT.

This circular is intended to present a method of testing farms for efficiency in management, with some general standards of efficiency, for the use of farm-management extension workers, county agents, farmers, and others, with special reference to agricultural conditions in the South. The method is by no means exhaustive in character, but it is expected that its use will be helpful.

Many factors influence the success of the farm business, and efficiency may be tested in numerous ways. Some of the more important tests are here given, such as (1) the production of family and farm supplies, (2) the yield per acre of crops, (3) the production per head of productive live stock, (4) the organization of the crop acreages, (5) the adjustment between labor requirements and labor supply, and (6) secondary tests directly influencing the main factors. These tests should be based on farm surveys, business summaries, and farm-practice records for the communities in which are located the farms considered. A business summary should be prepared for each farm, an average summary for all the farms in the community group, and an average summary for a given number of the best farms in the group.

With these summaries as a basis the farms should be measured individually, applying the tests in the order given, or in such order as circumstances and good judgment may suggest. In the following pages an exposition of these tests is given, with illustrative data and standards. These figures are based on prewar records and conditions, but it is thought that the principles involved will not be changed by war prices and costs.

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THE TESTS.

FAMILY AND FARM SUPPLIES.

1. Is the farm producing such of the family foods as are adapted to local conditions in ample quantities for the welfare of the family?

Farm-management studies have largely ignored this test—how much of the family living is furnished directly from the farm? However, this is one of the important factors determining the amount of the income of the farm and the degree to which the farm business is safe and profitable. This is especially true of the smaller farms.

The garden and live stock which supply the larger part of the family food are usually cared for at times that interfere comparatively little with the regular farm commercial enterprises, and by labor which otherwise would not be utilized. Further, it has been found that, up to a considerable size of farm business, when the family food is produced on the farm this item, plus the fuel and shelter furnished by the farm, amounts to an equivalent of the rent for the entire farm or interest on the whole farm investment.

As an illustration, in a community in Brooks County, Ga., that makes a specialty of producing its own farm food and farm feeds, the families on 106 farms consumed in 1914 food ranging in value per family from $104 to $1,283 and averaging $526. Approximately 85 per cent of this food was produced on the farms where the food was consumed. On farms having less than 75 acres of crop land, the part of the food produced on the farm amounted in value on an average to 48 per cent of the net income; and on farms having 250 acres or more of crop land the part of the food produced on the farm similarly amounted to 18 per cent of the net income. (See U. S. Dept. of Agriculture Bull. 648.)

On 149 farms pretty evenly distributed in Gaston County, N. C., Troup County, Ga., and McLennan County, Tex., the

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average family consumed food to the value of $454. Sixty-nine per cent of this food was produced on the farm.

Table I, following, taken from Farmers' Bulletin 1015, "Producing family and farm supplies on the cotton farm," presents the kind and quantity of farm foods consumed annually by the average adult person on the 255 farms mentioned in the two preceding paragraphs; two children of 12 years or under being considered equivalent to one adult:

TABLE I.—*Average annual consumption of various articles of food per adult person by 250 farm families in North Carolina, Georgia, and Texas.*

Article.	Amount consumed per adult person.	Article.	Amount consumed per adult person.
Vegetables:		Cereals:	
Beans.....pecks..	5.7	Corn meal.....lbs..	156
Beets.....do....	3.5	Flour.....do....	224
Cabbages.....head..	14	Sirups.....galls..	4
Cucumbers.....pecks..	2	Sugar 54 pounds = sirup, ...galls..	8.2
Melons.....number..	15	Dairy products:	
Onions.....pecks..	1.5	Butter, Buttermilk, Milk = milk...qts..	482
Peas.....do....	1.13		
Potatoes (Irish)....bush..	2		
Potatoes (sweet)....do....	5.11		
Sweet corn.....doz..	6.8	Beef.....lbs...	12
Tomatoes.....pecks..	4.1	Pork and lard.....do....	138
Turnips.....do....	4.5	Poultry products:	
Fruit:		Poultry.....lbs..	57.5
Apples.....bush..	1.4	Eggs.....doz..	28.4
Pears.....do....	.3		
Peaches.....do....	1.5		
Grapes.....do....	.25		
Berries.....qts...	11.5		

Until similar standards can be worked out for any community, Table I may be used as an aid in determining the approximate amount of foods to be provided for any given farm family, the number of farm animals needed to produce

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the animal products, and the amount of land needed for growing the plant products. The well-managed farm will be planned for producing for home consumption garden vegetables and fruits, cereals, sirup, dairy and poultry products, and meat.

Farmers' Bulletin 1015 suggests for an average family of five adult persons, or their equivalent, a vegetable garden of two-thirds of an acre, a fruit garden of one-half acre, one-third of an acre for a winter supply of white potatoes, one-half acre for late sweet potatoes, one-half acre of sugar cane for sirup and sugar, and one acre of corn for corn meal. These items make up a total of three and one-half acres for plant products.

2. Is the farm producing the necessary feeds for the proper feeding of (a) the family live stock, (b) the farm work stock, and (c) the commercial live stock of the farm, as far as they can be produced economically under local conditions?

Farm management studies in the Southern States indicate that the most profitable farms not only produce the necessary farm feeds, but have a surplus of them to sell; and that usually on the farms producing a surplus the live stock is of better quality and is better cared for than on farms where staple feeds are bought.

FEED FOR FAMILY LIVE STOCK.

In Farmers' Bulletin 1015, a plan is suggested for providing the average farm family with animal food products, according to which there should be kept two cows, 40 fowls for furnishing eggs and poultry meat, and for each adult person or equivalent one pig should be raised annually. Enough calves should be raised to replace each cow reaching the age of 8 years. It is calculated that this family live stock will require 1 ton of corn and cob meal, 1,234 pounds of cottonseed meal, 55 bushels of corn, 40 bushels of oats, 4,200 pounds of cowpea hay, 2,100 pounds

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of oat hay, 4,200 pounds of corn roughage, green forage from 2 acres, and 5 acres of pasture. At average yields for the cotton region these products will require 5½ acres of corn, 3½ of oats and oat hay, and 2 acres of soiling crops, making a total of 10 acres of crop land, besides the 5 acres of pasture.

FEED FOR WORK STOCK.

The work stock in the South is usually fed on grain and dry roughage during the fall, winter, and early spring. During the rest of the year this is supplemented on many farms by pasture and green feed, such as rye, sorghum, and corn. A fair provision per head of work stock would be 60 bushels of corn, 40 bushels of oats, and 3 tons of roughage; the last item may consist of 1½ tons of cowpea hay or velvet bean hay, 1 ton of oat straw and one-half ton of corn roughage. To provide this feed at average yields will require 3½ acres of corn, 2 of oats, 2 of cowpea hay, and 1 of pasture and green feed. (See Farmers' Bulletin 1015.)

The feeds above suggested for the family live stock and the work stock are not necessarily the best for all farms and all conditions. They are good staple feeds and are suggested as illustrating the procedure in applying this farm test. Other feeds may be substituted, according to the judgment of the person making the test or planning the farm organization.

ACRES NEEDED TO SUPPORT A 2-MULE FAMILY FARM.

On the basis of feeding suggested and at average yields per acre for the South the following acreages of food and feed crops will be required to feed properly a 2-mule family farm, averaging five adult persons or their equivalent.

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TABLE II.—*Acres needed to support a 2-mule family farm.*

[Figures in parentheses are for by-products or second crops.]

Item.	Garden.	Sugar cane.	Corn with cowpeas.	Corn roughage.	Oats and oat hay.	Cowpeas or velvet beans.	Soiling crops.	Cotton seed.	Pasture.
Vegetables	⅛	.....	.....	.....	.....	.....	.....	.....	.....
White potatoes	⅛	.....	.....	.....	.....	.....	.....	.....	.....
Sweet potatoes	⅛	.....	.....	.....	.....	.....	.....	.....	.....
Fruit	⅛	.....	.....	.....	.....	.....	.....	.....	.....
Meal for family	.....	.....	1	.....	.....	.....	.....	.....	.....
Sirup	.....	½	.....	.....	.....	.....	.....	.....	.....
Cows (2)	.....	.....	2	(9)	1½	(3)	2	(6½)	5
Chickens (40)	.....	.....	2	.....	2	.....	.....	.....	.....
Hogs (5)	.....	.....	1½	.....	.....	.....	.....	.....	(5)
Work stock (2)	.....	.....	7	(4½)	4	(4)	.....	.....	2
Total	2	½	13½	(13½)	7½	(7)	2	(6½)	7

Omitting by-products and second crops, the above-tabulated acreage requirements total 25½ acres of crop land and 7 acres of pasture, or 12¾ acres of crop land and 3½ acres of pasture per mule for the two-mule farm. A second crop is taken from 7 of the crop acres, and cowpeas or peanuts should be planted between the corn rows. These requirements are intended as a liberal provision for the family food and for feed for the farm live stock. In addition, there should be a surplus of garden stuff and dairy and poultry products to sell or exchange for groceries.

The foregoing acreages are calculated on the basis of average yields, which have been used by way of illustration. Many farms produce better yields than these, and those with average or less-than-average yields should better them. With higher yields the acreages above estimated can be reduced, or they can be maintained and a larger surplus sold.

COMMERCIAL ENTERPRISES.

3. Aside from providing for its own needs, are the crops and live stock the farm is producing for

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sale to the nonproducers of the community or for export to other communities, such as can be made profitable when produced and sold locally or exported?

The best guide here is the practice of the community; enterprises should be adopted that are found generally on its farms. A limited demand from the nonproducers of the community for some product not generally grown locally, and for which many local farms are not adapted, will sometimes afford a few farms opportunity for expansion.

For instance, the plan suggested for providing dairy products should, if followed, produce enough surplus calves to develop here and there cattle-raising and cattle-feeding farms. Some farms will be specially adapted to this purpose by having an abundance of suitable but unsalable by-products, cheap pasture, or pasture land unadapted to cropping. Other farms may develop a considerable business in the production of pork, or of pigs for supplying farms where brood sows are not kept. An occasional farmer will develop a business of producing seeds of some particular farm crop or crops to meet the needs of those lacking suitable skill and experience for such production. Outside communities may need some product like pork, sirup, fruit, or truck, which, because of climatic or other limitations, they can not produce, but which can be provided by the local community. Such enterprises should be taken up gradually and after full investigation as to their economic value.

YIELDS PER ACRE.

4. Are the yields per acre of the farm crops satisfactory? Are they high enough to make the best possible returns for capital and labor expended in producing them?

Farm-management studies indicate that on farms of the same type and size higher yields per acre are usually accompanied by larger net incomes, and lower yields by lower net incomes.

101549—19——2

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In a group of 110 farms in Anderson County, S. C., cotton on farms yielding less than 240 pounds per acre, selling at 11½ cents per pound in 1914, did not pay the cost of production; that is, did not pay current expenses for the crop and give a fair return for the time and labor spent on the crop and a fair rent for the land used in growing the crop. On the farms that averaged a higher yield than one-half a bale per acre the cost of production receded on an average practically 1 cent per pound for every 60 pounds increase in yield per acre. (See Dept. of Agriculture Bull. 651, A Farm Management Study in Anderson County, S. C.)

In a group of 24 farms of 50 acres or less of crop land worked by their owners in Sumter County, Ga., in 1913, 13 farms, having cotton yields of 250 pounds or less per acre, had an average farm income of $210, a poor return for the use of the land and the farmer's time and labor; while 11, with yields of cotton of over 250 pounds per acre, had an average farm income of $348 (Table III).

In another group of 41 farms in the same county (Table III), ranging in size from 51 to 100 acres of crop land, 15 farms having yields of 250 pounds or less of cotton per acre had an average farm income of $447, while 26 in the same group with yields of cotton above 250 pounds had an average farm income of $728.

In another group of 39 farms (Table III) ranging in size from 101 to 150 acres of crop land 11 farms having a cotton yield of 250 pounds per acre or less received an average farm income of $676, while 28 with yields above 250 pounds per acre had an average farm income of $1,306.

In still another group of 31 farms ranging in size from 151 to 250 acres of crop land 11 farms with cotton yields of 250 pounds or less per acre had an average farm income of $1,379, while 20 with yields above 250 pounds had an average farm income of $2,326.

These data are presented in Table III, together with some related factors.

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TABLE II.—*Average farm incomes on farms in Sumter County, Ga., having cotton yields of 250 pounds and under per acre and farms having cotton yields of over 250 pounds.*

Size groups and yields per acre.	Number of farms.	Average yield cotton per acre.	Average farm income.	Average crop land.	Average crop land per mule.	Average percentages of crop land in cotton.
		Lbs.		*Acres.*	*Acres.*	
Farms of 50 acres and less of crop land:						
250 pounds cotton and less	13	202	$210	38	23	46
Over 250 pounds cotton	11	355	348	29	21	46
Farms of 51 to 100 acres of crop land:						
250 pounds cotton and less	15	216	447	72	21	43
Over 250 pounds cotton	26	324	728	74	25	48
Farms of 101 to 150 acres of crop land:						
250 pounds of cotton and less	11	213	676	121	27	54
Over 250 pounds cotton	28	313	1,306	121	27	53
Farms of 151–250 acres of crop land:						
250 pounds of cotton and less	11	208	1,379	197	30	58
Over 250 pounds cotton	20	353	2,626	197	27	56

In the group of small farms averaging 29 acres of crop, an average yield of 355 pounds of cotton is required per acre to make an average farm income, barely sufficient to pay a fair rental for the use of the land and give the operator ordinary wages for his labor and management in addition to supplies furnished the family from the farm, which are not included in the farm income in this table. Not until we reach the group with an average of 121 crop acres do we find that an average yield of less than 215 pounds of cotton per acre made an average farm income sufficient for rent and farmer's wages.

It will be noted that within the size groupings acres of crop land, acres of crop land per mule, and percentages of crop land in cotton practically counterbalance; the influence of these factors is therefore eliminated from the figures showing influence of yields.

In Brooks County, Ga., the 25 best-paying farms of all sizes in a group of 110 farms yielded an average of over 315 pounds

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of cotton per acre, while average yields of less than 200 pounds per acre did not pay the cost of production.

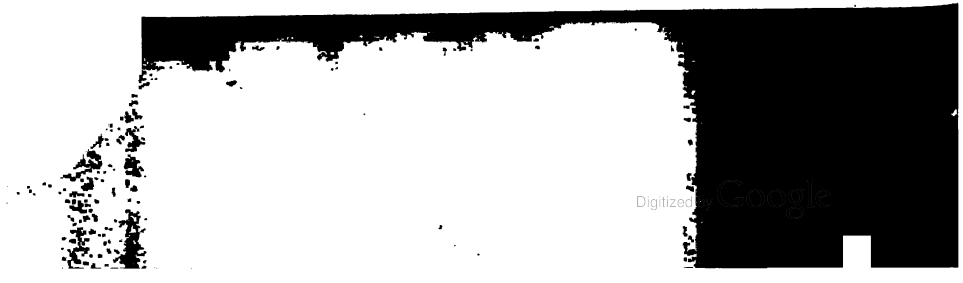
In Anderson County, S. C., it was found that the influence of yield on cost of production was just as marked with corn as it is with cotton, and that under prewar conditions corn did not pay cost of production when yields averaged less than 17 bushels per acre (U. S. Dept. of Agriculture Bull. 651). In Brooks County, Ga., it was found that corn did not pay a margin over cost of production with yields under 18 bushels (U. S. Dept. of Agriculture Bull. 648).

In all parts of the cotton country where similar studies have been made, not only with cotton and corn, but with other crops, the findings teach the principle that the general tendency is for the cost per bushel and per pound to grow less and the net income of the farm to grow greater as the number of bushels or pounds per acre increases.

5. Is the farm making special efforts toward the use of available farm manures, including the planting and growth of summer and winter catch and cover crops of small grains or legumes between the rows of cotton, corn, or other intertilled crops and on open fields and idle land to conserve and improve the fertility of the soil and thereby increase the yields of the succeeding crops?

6. Are the varieties of the crops grown on the farm the best varieties for large yields and profitable production under the existing conditions? Is special attention paid to the selection and care and testing of farm seeds, having in view perfect stands and large yields?

7. Are the methods of soil preparation and the cultivation and handling of crops in accordance with the best known practices for the region, and are they adequate for the most profitable production?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8. Is the farm making judicious use of commercial fertilizers in accordance with the best known practice for the region?

The State college of agriculture and the experiment stations should be consulted as to the best crop varieties, the best methods of selecting and caring for seeds, and the best tillage and fertilizer practice for the community.

QUALITY OF LIVE STOCK.

9. Is the quality of the farm live stock satisfactory?

This test has reference to the family live stock as well as to the work stock and stock kept expressly for commercial purposes.

It does not pay to grow low-grade or scrub stock of any kind; and there is room for improvement along this line on many cotton farms.

We have no records of the influence of production per head of live stock on farm income in the cotton States, but in a survey made in Chester County, Pa., on 289 commercial dairy farms, it was found that the 48 farms receiving $50 and less income per cow had labor incomes 45 per cent below the general average, while 28 farms with receipts per cow of more than $120 had labor incomes 75 per cent above the average and were the most profitable of the group.

10. Is the management of the live stock on the farm, both productive stock and work stock, in accordance with the best-known practice for the region?

Farmers' Bulletins 743, "Feeding of Dairy Cows"; 528, "Hints to Poultry Raisers"; and 874, "Swine Management," will be useful in this connection. It will be well also to consult the college of agriculture and experiment stations for advice on the kinds, breeds, and care of live stock suited to the region.

11. Aside from the family live stock and the work stock, is the farm carrying enough produc-

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tive stock to consume surplus pasture and unsalable crop by-products and convert them into profitable form?

ORGANIZATION OF THE CROP LAND.

12. Are the crop acreages of the farm adjusted to each other for highly profitable production?

The efficient adjustment or organization of the crop land will depend on (*a*) the acreage necessary to supply the family and farm needs; (*b*) the economic importance of enterprises adapted to the region, particularly as to market demand and the relation of prices to costs of production and marketing; (*c*) the seasonal labor requirements of the enterprises; (*d*) the supply of labor and its cost; (*e*) the topography of the farm; (*f*) the size of the farm.

In the Southern States cotton is the predominating market crop, because of its adaptability to soil, climate, and labor conditions and to the great demand for it in regions where it can not be produced. Hence, in those parts of the cotton belt where the menace of the boll weevil and shortage of labor are not severe, and with the exception of special localities where the competition of other enterprises is strong, the procedure in testing the organization of the crop land should be as follows:

Has the farmer set aside sufficient acreage to provide well for the family and farm foods and feeds? Part of the crops grown for these purposes should be legumes for enriching the rations and improving fertility. (Consult Farmers' Bulletin 1015.)

After providing for family and farm supplies, has the farmer set aside for cotton as many acres as can be cared for properly and harvested with the available farm equipment and such outside assistance as can be relied upon?

After providing for farm needs, including fertility, and for such acreage of cotton as can be cared for well, has the remainder of the land, if there is any, been devoted to other

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enterprises in the order of their importance? Such enterprises are: Increasing the acreage of food and feed crops for sale or for extending the productive live-stock enterprises; adding some other commercial enterprise, such as peanuts, or soy beans, for feed or oil; or some more intensive enterprise like sirup making or truck growing. But these added enterprises must not seriously compete with the cotton in its labor requirements or tend to diminish the fertility of the soil.

As a guide in testing the cropping system until local standards can be worked out, we may take as general standards the records from some surveys that have been made in the cotton country.

In the Sumter County, Ga., survey, previously referred to, there were nine 1-mule cotton farms operated by white owners; the best five of them averaged 23 acres of crop land per mule. Of this, 9.8 acres, or less than half, was planted to cotton. The remainder was divided as follows: 7.2 acres in corn, 2.7 in oats or oat hay, 3.6 were second-cropped with cowpea hay, leaving 3.3 acres for miscellaneous purposes. (See Table IV.)

Of twenty-three 2-mule farms the best five averaged 30.2 acres of crop land per mule. Of this, 10.6 acres were planted to corn, 3.9 to oats and oat hay, 2 acres were second-cropped with cowpea hay, 14 acres were devoted to cotton, and 1.7 to miscellaneous crops (Table IV).

Of twenty-five 3-mule farms the best five averaged 32.58 acres of crop land per mule, of which 17.47 acres were planted to cotton, the remainder going largely into food and feed crops (Table IV).

Of eighteen 4-mule farms the best five averaged 30 acres of crop land per mule; 18.85 of this went into cotton, the remainder being planted to supply crops (Table IV).

Of nineteen 5-mule farms the best five averaged 27.1 acres per mule and planted 15½ of this in cotton (Table IV).

The best five of fifteen 6-mule farms averaged 34½ acres of crop land per mule and planted 19½ acres of this in cotton (Table IV).

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Table IV gives the average organization per mule of the crop land for each group of five best farms and averages for the six groups. These best farms grade high in acres per mule, yields, organization, and resulting income.

TABLE IV.—*Organization of crop land per mule on 30 cotton farms in Sumter County, Ga.*

Farm groups.	Average acres of—					Average total acres of crops per mule.	Productive workdays on crops per mule.	Average farm income per mule.
	Cotton per mule.	Corn per mule.	Oats and oat hay per mule.	Cowpea hay[a] per mule.	Miscellaneous crops per mule.			
Best five 1-mule farms.....	9.8	7.2	2.7	3.6	3.3	26.6	98	$479
Best five 2-mule farms.....	14	10.6	3.9	2	1.7	32.2	133	353
Best five 3-mule farms.....	17.47	11.8	1.6	2	1.71	34.58	147	430
Best five 4-mule farms.....	18.85	8.5	1.73	.....	1.05	30.08	145	458
Best five 5-mule farms.....	15.5	8.1	1.9	1.32	1.18	28	124	330
Best five 6-mule farms.....	19.5	9.83	3.66	2.45	1.56	37	161	380
Average for 30 farms..	15.85	9.33	2.58	1.90	1.81	31.41	135	405

[a] The cowpea hay is second crop, grown after oats or some other early crop.

By referring back to Table II it will be seen that apparently only one of the groups of best farms, that of the 1-mule farms, came near the standard set for providing for the family and farm needs. Most of the farms represented in the table could probably be made more efficient along these lines.

Some additional facts as to tilled acres per farm and per mule, per cent of land in cotton, yields of cotton and corn per acre, and the farm income are given in Table V.

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TABLE V.—*Average of total tilled acres, tilled acres per mule, per cent of land in cotton, yields of cotton and corn, farm income per mule, and total farm income, for 30 farms in Sumter County, Ga.*

Farm groups.	Average total tilled acres per farm.	Average tilled acres per mule.	Average per cent of land in cotton.	Average yield per acre of cotton.	Average yield per acre of corn.	Average farm income per mule.	Average total farm income.
				Lbs.	*Bush.*		
Best five 1-mule farms	23	23	44.3	311	28.1	$479	$479
Best five 2-mule farms	60.4	30.2	45.7	298	15.7	353	705
Best five 3-mule farms	97.75	32.58	54.16	304	13.8	430	1,291
Best five 4-mule farms	120.3	30	61.46	321	14.6	458	1,833
Best five 5-mule farms	133.4	26.68	58.3	298	12	330	1,650
Best five 6-mule farms	207.3	34.55	56.7	284	16.6	380	2,283
Average for 30 farms	.....	29.58	53.44	302.7	16.8	405	.....

The difference between tilled acres per mule in this table and acres of crops per mule in Table IV is the amount of land that was cropped a second time, and amounts here to the acreage in cowpeas after oats. Cowpeas planted between the rows of corn are not included in this second crop acreage.

In Brooks County, Ga., a study was made on an area of light sandy loam. In order to obtain profitable yields on this light soil, it was necessary to pay particular attention to the maintenance of soil fertility, and a system was developed which gives a smaller relative acreage to cotton and pays particular attention to legume crops and hogs. The hogs graze on wild pasture and winter grain, doing considerable harvesting of the corn and peanuts and gleaning other crop fields. Table VI gives the organization of the crop land for farm groups similar to those treated in Tables IV and V.

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TABLE VI.—*Organization of crop land per mule on 30 farms in Brooks County, Ga.*

Farm crops.	Average acres of—								Average days' work on crops per mule.
	Cotton per mule.	Corn per mule.	Peanuts in corn per mule.	Peanuts per mule.	Oats and rye per mule.	Cowpea hay per mule.	Miscellaneous crops per mule.	Crops per mule.	
Best five 1-mule farms...	8.9	13.8	13.4	.....	1.2	0.8	1.83	26.53	97
Best five 2-mule farms...	8.1	15.5	15.4	1.5	2.25	2.05	4.42	33.82	125
Best five 3-mule farms...	12.13	11.2	7.2	1.73	7.27	7.07	3.00	42.40	134
Best five 4-mule farms...	6.55	15.85	12.9	3.5	6.3	3.85	4.31	40.36	125
Best five 5-mule farms...	9.10	13.34	8.1	.76	7.7	3.86	4.66	39.38	132
Best five 6-mule farms...	6.73	11.48	6.53	4.73	6.46	4.53	4.05	37.98	119
Average for 30 farms.....	8.57	13.53	10.59	2.04	5.20	3.69	3.71	36.74	122.3

For each mule these farms carried an average equivalent of three mature cattle, including dairy stock and sixteen 200-pound hogs, including two brood sows. It will be noticed that cotton has been reduced to about one-half the acreage on the Sumter County farms, and that corn, peanuts, hogs, and miscellaneous crops have taken a more prominent place.

Further facts relative to these Brooks County farms are given in Table VII. Among the important miscellaneous crops were watermelons, sweet potatoes, Irish potatoes, and sugar cane.

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TABLE VII.—*Averages of total tilled acres per farm, tilled acres per mule, percentage of tilled land in cotton and corn, yields of cotton and corn, number of hogs, and net income on groups of farms in Brooks County, Ga.*

Farm groups.	Average total tilled acres per farm.	Average tilled acres per mule.	Average per cent of tilled acres in cotton.	Average per cent of tilled acres in corn.	Average yields of cotton per acre.	Average yields of corn per acre.	Average equivalent of mature hogs per mule.	Average net income per mule.[a]	Average net income per farm.[a]
					Lbs.	*Bush.*			
Best five 1-mule farms..	25.33	25.33	35.92	53.34	300	12	10.6	$577	$577
Best five 2-mule farms..	65.7	32.87	27.51	45.51	318	15	18.5	555	1,112
Best five 3-mule farms..	109.1	36.29	33.89	31.27	302	14	17.8	581	1,742
Best five 4-mule farms..	144.6	36.15	17.9	43.67	324	14	17.3	514	2,056
Best five 5-mule farms..	175.8	33.16	28.32	37.58	299	13	14.8	490	2,448
Best five 6-mule farms..	199.2	33.2	20.74	34.73	323	14	17	427	2,561
Average for 30 farms		32.83	27.4	41.0	311	13.7	16	524	.....

[a] Net income includes what the farm furnished the family.

LABOR UTILIZATION.

13. Are the labor requirements of the productive enterprises of the farm as organized sufficient to make the best utilization of the work-stock equipment necessary to operate the farm?

As a measure for this test, we may use the experiences of the more successful farms of the type in the community.

For example, turning back to Tables IV and V, we find that on the best one-mule farms in the Sumter County community an average of 27 acres of crops on 23 acres of crop land were worked with one mule. Therefore we should expect that the mule requirements on farms of this type that have less than 23 acres of tilled land or 27 acres of crops are not sufficient to utilize properly the labor of the one mule necessary to operate the farm.

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Likewise, on the best two-mule farms of the community, 60 acres of crop land and 64 acres of crops were worked with a two-mule equipment, and we should expect that the mule-labor requirement on farms of this type that have less than 60 acres of crop land or 64 acres of crops are not sufficient to utilize properly the labor of a two-mule farm.

By the same reasoning we should expect that the labor requirements of a farm of this type of less than 98 acres of crop land, or 104 acres of crops, would not be sufficient to use the labor of three mules with the best efficiency, and so on, with the larger mule equipments.

For farms of the Brooks County type, as shown in Tables VI and VII, anything smaller than 25 acres of crop land or 26½ acres of crops for a one-mule farm, 66 tilled acres for a two-mule farm, 109 acres of crop land or 127 acres of crops for a three-mule farm would not have labor requirements sufficient to utilize properly the work-stock equipment necessary to operate them.

While these figures represent the averages of the best farms in the various groups, and make an excellent and conservative guide, they do not represent the highest possible efficiency. For instance, in the group of the five best three-mule farms in Sumter County, there was one farm on which each mule worked an average of 20 acres of cotton, 16⅔ acres of corn, 1⅓ acres of oats, followed by 1⅓ acres of cowpea hay, and 1.41 acres of miscellaneous crops, or a total of 40.71 acres of crops per mule, and each mule worked an average of 187 days, which is a very good average, considering that there are about 230 days in the year available for crop work in this region.

With a cotton yield of 290 pounds per acre, the farm income of this farm was $632 per mule, or $1,896 for the three-mule farm.

If it is found that the labor requirements of the farm are not sufficient to reach high efficiency in utilizing the available time of the work-stock equipment necessary to operate the farm, is it possible to bring into use idle tillable land, to reclaim wild

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land, or to rent additional land and thus increase the efficiency of the farm labor and equipment?

14. Is the present equipment of work stock sufficient to operate the farm efficiently?

As a measure for this test, we may again use Tables IV, V, VI, and VII, or similar tables compiled for the community in which the farm is located.

If it is found that the work-stock equipment is not sufficient to operate properly the farm, is it possible to add more work stock or by renting out a few acres bring the farm to a size that can be operated efficiently by the present outfit?

15. Are the man-labor requirements of the productive enterprises of the farm as organized sufficient to make the best utilization of the time of the regular men necessary to operate the farm?

As a basis for this test we may use the experience of the best farms of the community. For illustration and general standards we may take the Sumter and Brooks County, Ga., groups of best farms.

On the southern farms one or more men are occupied regularly in management, and work the entire year. Other laborers or members of the family are employed to work by the acre, by the hundredweight of crop, or by the day, at such work as chopping and hoeing, picking cotton, or other miscellaneous work, and are paid for the actual time employed.

Available days.—If from the total number of days in each month we deduct Sundays, holidays, rainy days, and other days not suited for field work, we get a set of numbers which represent the days in each month that are available for field work on the farm. The sums of these numbers will be the total number of days available for field work during the year.

If we add together the number of available days for each regular man on the farm for the time he is employed we will have the total time available for regular field work. For ex-

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ample, the following days per month were found to be available for field work in Sumter County, Ga.

TABLE VIII.—*Days available for field work per month in central Georgia.*

Months.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Days available.....	16	15	19	19	21	20	21	21	20	20	20	18	230

A man working the entire year will be able to work in the field 230 days, provided there is sufficient work to keep him busy, and a man working seven months, from January 1 to July 31, will be able to work in the field 132 days, if that much work is provided for him.

Table IX gives the same data for communities in southern Georgia:

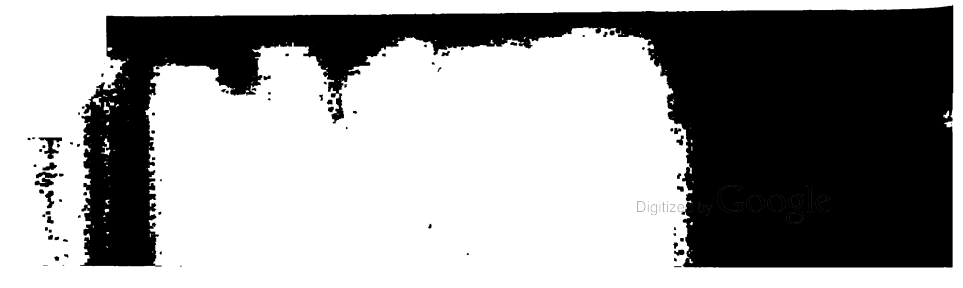
TABLE IX.—*Days available for field work per month in southern Georgia.*

Months.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Days available.....	18	18	20	22	21	20	20	21	22	22	22	19	245

One man working the entire year and two men working six months each from January 1 would be able to do a total of 483 days of field work, an average of 161 days per man, provided there was that much work to be done.

Work days required.—If on a given farm we find the number of days necessary to do the contract and miscellaneous day wage work and subtract the amount from the total number of days' work required by all the productive enterprises, the remainder will be the number of productive days' work required of the regular men of the farm.

If we divide this number of productive days' work required of the regular men of the farm by the number of days available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for field work at their command, we will get a number expressing the percentage of efficiency with which their time has been utilized.

For example, the group of five best 4-mule farms in the Sumter County community (see Tables IV, V, and X) has an average of 4.8 regular men per farm. These men had a total of 1,016 days available for field work. There was a total of 1,184 days' work required by the productive enterprises. Of these, 512 were cared for by contract and miscellaneous hired and family labor, leaving 671 days for the regular men. This means 212 days available per regular man, of which 140 days, or 68 per cent, were required for and utilized on productive enterprises.

Table X gives the average number of men, the days available per regular man, the number of days' work required per regular man on productive enterprises, and the per cent of the time utilized on the groups of best farms in the Sumter County community.

TABLE X.—*Utilization of regular man labor on groups of farms in Sumter County, Ga.*

[Average figures.]

Farm groups.	Regular men per farm.[a]	Days per regular man.		Per cent of available time used on productive enterprises.
		Available for field work.	Work on productive enterprises required.[b]	
	Men.	*Days.*	*Days.*	*Per cent.*
Best five 1-mule farms	1.2	218	94	43
Best five 2-mule farms	2.4	217	115	53
Best five 3-mule farms	4.2	177	118	67
Best five 4-mule farms	4.8	212	140	66
Best five 5-mule farms	6	206	135	65
Best five 6-mule farms	7	192	143	74
All farms		204	124	61.3

[a] Operators, croppers, and men employed by the month for a whole or part of the year. Two hundred and thirty days in the year are available for field work for a man on the farm the entire year.

[b] This figure is formd by deducting cotton picking and other contract and miscellaneous family and hired labor performed on the enterprises from the total man labor requirements of the enterprise and dividing the remainder by the number of regular men.

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Table XI gives the same facts for the groups of best Brooks County farms.

TABLE XI.—*Utilization of regular man labor on groups of farms in Brooks County, Ga.*

[Average figures.]

Farm groups.	Regular men per farm.[a]	Days per regular man.		Per cent of available time used on productive enterprises.
		Available for field work.	Work on productive enterprises required.[b]	
	Men.	*Days.*	*Days.*	*Per cent.*
Best five 1-mule farms	1	243	115	47
Best five 2-mule farms	2.4	220	144	65
Best five 3-mule farms	3.4	203	147	72
Best five 4-mule farms	4.2	170	119	70
Best five 5-mule farms	5.4	192	140	73
Best five 6-mule farms	5.5	187	136	73
All farms		202.5	133.7	66.7

[a] Operators, croppers, and men employed by the month for a whole or part of the year. Two hundred and forty-five days in the year are available for field work for a man on the farm the entire year.

[b] This figure is found by deducting cotton picking and other contract and miscellaneous family and hired labor performed on the enterprise from the total man-labor requirements of the enterprise and dividing the remainder by the number of regular men.

These figures give us an idea of what may be expected in the utilization of regular man labor on well-organized farms like those considered in Tables IV and VII in the regions where those farms are located.

Under test 13 (p. 19) the measures of mule labor utilization suggested are the number of acres of crop land and the number of acres of crops worked per mule.

Under test 15 (p. 21) the measure of labor utilization employed is a percentage figure representing the relation of the total number of days' work required per regular man to the number of days available for field work per regular man.

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In checking up the influence of organization on labor efficiency it may sometimes be desirable to compare the labor available with that required by months or fractions of a month throughout the year. Such a comparison will show in what months, if any, the labor is not fully utilized, and will serve as a guide in readjusting the acreages of the enterprises, in extending the present organization over more acres, or in adding other enterprises. For such monthly comparisons of the labor required and the labor available it will be necessary to determine for the individual farm or for the farm communities:

1. The number of days in each month on which labor can usually be performed after deducting Sundays, holidays, rainy days, and days when the soil is not in condition to work.

2. The average practice in working the crops and the labor required per acre for the farm in question or for the region.

3. The distribution of this labor by months or fractions of a month throughout the year.

By way of example the above data for central Georgia are given in Tables XII, XIII, XIV, and XV.

TABLE XII.—*Number of days available for field work per month in central Georgia.*

Months.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Days available.....	16	15	19	19	21	20	21	21	20	20	20	18	230

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TABLE XIII.—*Field practice and labor requirements for some crops in central Georgia.*

Operation.	Sweet potatoes.		Sugar cane.		Sorghum.		Corn.		Cotton.	
	Man days.	Horse days.	Man days.	Horse days.	Man days.	Horse days.	Man days.	Horse days.	Man days.	Horse days.
Cut stalks, clean land	.....	.....	0.10	0.20	0.11	0.22	0.11	0.22	0.12	0.24
Break	0.65	1.25	.59	1.28	.50	1.05	.50	1.05	.67	1.40
Bed seed	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harrow	.14	.28	.06	.16	.16	.47	.16	.47	.19	.40
Bed	.....	.....	.64	.99	.20	.36	.20	.36	.46	.53
Fertilize	.94	.80	.53	.35	.14	.13	.14	.13	.20	.20
Plant	1.50	.....	.35	.....	.06	.07	.06	.07	.16	.16
Harrow and cultivate	1.88	1.02	1.72	1.72	.95	1.18	.95	1.18	1.42	1.54
Chop, hoe, thin	1.29	.....	.80	.....	.....	.....	.....	.....	1.30	.....
Cut green and haul	.....	.....	.....	.....	.50	.50	.....	.....	.....	.....
Strip fodder	.....	.....	.....	.....	.....	.....	.93	.....	.....	.....
Strip, cut, and haul	.....	.....	7.06	.99	.....	.....	.....	.....	.....	.....
Pick and haul to gin	.....	.....	.....	.....	.....	.....	.....	.....	6.70	.56
Harvest and market	3.00	1.34	.....	.....	.....	.....	.70	.35	.06	.13
Grind and evaporate	.....	.....	3.50	1.50	.....	.....	.....	.....	.....	.....
Bank seed cane	.....	.....	.40	.....	.....	.....	.....	.....	.....	.....
Total	9.65	4.69	15.75	7.19	3.62	3.98	3.75	3.83	11.28	5.16

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TABLE XIV.—*Field practice and labor requirements for some crops in central Georgia.*

Operation.	Fruit.		Peanuts.		White potatoes.		Oats and rye.		Cowpea hay.	
	Man days.	Horse days.	Man days.	Horse days.	Man days.	Horse days.	Man days.	Horse days.	Man days.	Horse days.
Break	0.52	0.50	0.60	0.80	0.60	1.20	0.59	1.06	0.29	0.44
Seed									.07	.03
Harrow					.20	.40			.10	.20
Cut seed					1.00					
Lay off			.20	.20	.30	.30				
Fertilize	.23	.09			.86	.70	.25	.09		
Plant			.80	.20	1.50	.50				
Cultivate	1.10	1.52	.80	.80	1.24	1.24				
Hoe			1.10		1.00					
			a3.50	a2.60						
Spray	1.18	.75			.25	.25				
Dig, gather, haul	4.89	.92			2.79	1.50				
Pull, bunch, haul			1.60	.70						
Cut, shock, rake							.40	.30	.22	.35
Haul, thrash							.31	.23	.37	.28
									b1.05	b1.30
Prune	.58	.68								
Whitewash	.37	.07								
Dig borers	.45									
Bale									.70	.31
Total	9.32	4.53	5.10	2.70	9.74	6.09	1.55	2.28	1.75	1.61

a Total for peanuts hogged off.
b Total for cowpea hay not baled.

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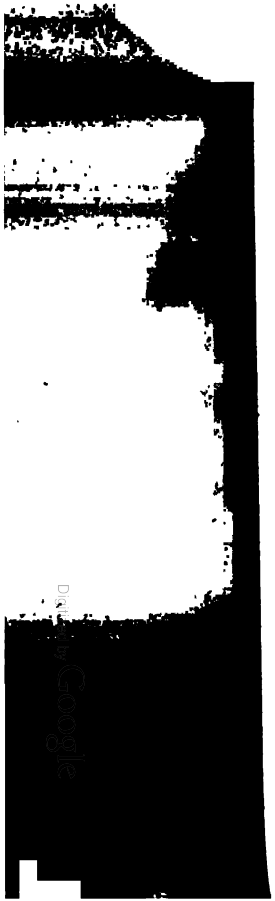

TABLE XV.—*Distribution by months of the average number of days of man labor and horse labor expended in growing 1 acre of each of the following crops in central Georgia.*

Crops.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.
Vegetables:													
Man.....days..	0.50	0.73	2.06	2.07	2.42	1.85	1.84	1.81	1.77	1.59	0.20	.....	16.84
Horse.....do....	.39	1.01	1.85	1.45	1.05	.69	.90	.80	.63	.55	.....	.....	9.32
Fruit:													
Man.....do....	1.44	.44	.....	.29	1.19	3.00	.99	.....	.....	.07	.54	1.36	9.32
Horse.....do....	1.04	.42	.....	.18	.36	.56	.18	.....	.....	.08	.60	1.11	4.53
Sweet potatoes:													
Man.....do....	.64	.39	.61	.97	1.78	2.33	.57	.....	.....	.97	.75	.64	9.65
Horse.....do....	.26	.75	.70	.62	.55	.44	.29	.....	.....	.46	.36	.26	4.69
Late white potatoes:													
Man.....do....	.....	.....	.....	.....	.....	.....	2.10	3.58	1.27	.70	2.09	.....	9.74
Horse.....do....	.....	.....	.....	.....	.....	.....	1.55	2.27	.82	.50	1.00	.....	6.14
Sugar cane:													
Man.....do....	.43	.64	.99	.19	1.37	.79	.38	.....	.....	2.75	8.21	.....	15.75
Horse.....do....	.93	1.04	.73	.33	.57	.72	.38	.....	.....	.33	2.16	.....	7.19
Sorghum fed green:													
Man.....do....	.20	.25	.29	.34	.51	.59	.50	.50	.50	.....	.....	.19	3.62
Horse.....do....	.42	.59	.56	.39	.62	.55	.12	.12	.12	.....	.....	.47	3.96
Corn:													
Man.....do....	.20	.25	.29	.34	.51	.34	.....	.93	.....	.35	.35	.19	3.73
Horse.....do....	.42	.59	.56	.39	.62	.43	.....	.....	.....	.17	.18	.47	3.85
Oats:													
Man.....do....	.....	.....	.09	.....	.13	.42	.16	.....	.38	.37	.....	.....	1.55
Horse.....do....	.....	.....	.....	.....	.10	.31	.12	.....	.88	.87	.....	.....	2.28
Cow peas for hay:													
Man.....do....	.....	.....	.....	.....	.....	.30	.16	.....	.38	.21	.....	.....	1.09
Horse.....do....	.....	.....	.....	.....	.....	.44	.23	.....	.42	.21	.....	.....	1.30
Peanuts hogged off:													
Man.....do....	.....	.....	.....	.....	1.60	1.90	.....	.....	.....	.....	.....	.....	3.50
Horse.....do....	.....	.....	.....	.....	1.35	.65	.....	.....	.....	.....	.....	.....	2.00
Cotton:													
Man.....do....	.38	.31	.33.	.63	1.27	1.05	.32	.....	2.11	2.32	2.32	.24	11.28
Horse.....do....	.79	.64	.43	.68	.54	.57	.34	.....	.18	.20	.19	.60	5.16

With data similar to the above in hand, a farm organization can be tested in detail for its efficiency in utilizing the labor of man and horse equipment necessary for its operation. The following example is given by way of illustration:

A certain farm in central Georgia has 59.5 acres of crop land, 65 acres of permanent tillable pasture land, 10 acres occupied by buildings, roads, and waste, and 178 acres of woods. The family on this farm consists of 5 adults and 5 children under 16 years of age, or an equivalent of 7½ adults.

In 1914 the live stock on this farm consisted of 2 mules, 2 cows, 6 head of young stock, 2 brood sows, 12 pigs and shoats, 59 poultry, and 20 stands of bees.

The crop land was divided as follows: ¼ acre of garden, 1 acre of sweet potatoes, ¼ acre of sugar cane, 30 acres of corn, 10 acres of oats and rye followed by 8 acres of cowpeas and velvet beans for hay, 4 acres of peanuts for hogs, and 14 acres of cotton.

Table XVI gives the mule labor available and the mule labor requirements of these crops by months. The first line of this table gives the days of mule labor available each month from 2 mules. These amounts are found by multiplying the number of days available for field work in each month in Table XII by 2, the number of mules.

Then follows the number of mule days required each month by the crops of this farm on the basis of average practice for the region. These figures are found by multiplying the acre requirements of the crops for each month in Table XV by the number of acres of the crop grown.

The total requirement of the 59½ acres of crop land or 67½ acres of crop for each month is then subtracted from the labor available for that month, and in the last line is found the number of unused mule days for each month.

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TABLE XVI.—*Mule labor data on a farm in central Georgia.*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Days of mule labor available from 2 mules	32.00	30.00	38.00	38.00	42.00	40.00	42.00	42.00	40.00	40.00	40.00	36.00	460.00
Days of mule labor required by crops:													
Garden vegetables, ½ acre	.10	.25	.46	.36	.26	.17	.23	.20	.16	.14	.....	.....	2.33
Sweet potatoes, 1 acre	.26	.75	.70	.62	.53	.44	.29	.....	.....	.46	.36	.26	4.69
Sugar cane, ½ acre	.23	.26	.18	.08	.14	.18	.10	.....	.....	.08	.54	.....	1.79
Corn, 30 acres	12.60	17.70	16.80	11.70	18.60	12.90	.....	.....	.....	5.10	5.40	14.10	114.90
Oats and rye, 10 acres	.....	.....	.....	.....	1.00	3.10	1.20	.....	8.80	8.70	.....	.....	22.80
Cowpeas and velvet bean hay, 8 acres	.....	.....	.....	.....	.....	3.52	1.84	.....	3.36	1.68	.....	.....	10.40
Peanuts, 4 acres	.....	.....	.....	.....	5.40	2.60	.....	.....	.....	.....	.....	.....	8.00
Cotton, 14 acres	11.06	8.96	6.02	9.52	7.56	7.98	4.76	.....	2.52	2.80	2.66	8.40	72.44
Total required (for crop land, 59½ acres; acres of crops, 67½)	24.25	27.92	24.16	22.28	33.51	30.89	8.42	.20	14.84	18.96	8.96	22.76	237.15
Remaining mule labor (days)	7.75	2.08	13.84	15.72	8.49	9.11	33.58	41.80	25.16	21.04	31.04	13.24	222.85
	23.67			66.90				132.28					

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This farm is working 29¾ acres of land per mule, on which it grows 33¾ acres of crops per mule. This is considerably above the average, but is using only 52 per cent of the mule days available for field work.

The available mule labor for February is pretty well used up, but during the three soil-preparation months of January, February, and March there is a surplus of 24 mule days. In the planting and cultivation months there are 67 days, and during the remainder of the year there are 132 days not used, making a total of 232 mule days, or 48 per cent of the total available mule days still to be used if desired and conditions permit.

According to the standards set up in test 1 (p. 4), this 2-mule farm, with a family of 7½ adults or their equivalent, should provide for home use 1 acre of garden vegetables, ¾ acre of fruit, ½ acre of late white potatoes, ¾ acre of sweet potatoes, and ¾ acre of sugar cane. The record of the farm shows that there was ¼ acre of garden, no fruit, 1 acre of sweet potatoes, and ¼ acre of sugar cane.

So, by way of illustration, suppose that in the way of reorganization we add to the crops of this farm ¾ acre of garden vegetables, ¾ acre of fruit, and ½ acre of white potatoes. The farm was planting plenty of sweet potatoes and had 20 stands of honey bees to supply sweets in addition to the ¼ acre of sugar cane; therefore we will not increase the sweet-potato and sugar-cane area.

The family live stock on this farm is ample for family needs, as the records show some butter sales from the two cows, sales of eggs from the flock of 59 head of poultry, and some sales of meat from the 12 pigs and shoats on hand at the beginning of the year. According to approximate standards suggested under test 2 (p. 6), this live stock will require the acreage of crops indicated in Table XVII.

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TABLE XVII.—*Acreage of crops needed to feed the indicated farm live stock.*

[The parentheses indicate a second product, second crop, or double use of the land.]

Kind of live stock.	Corn.	Corn rough-age.	Oats and oat hay.	Cow-pea hay.	Soil-ing crops.	Pas-ture.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
2 cows	2	(9)	1.5	(3)	2	5
6 young stock	3	(8.5)	3.5	(4)	.....	7
59 poultry	3	.....	3	.....	.....	.....
2 brood sows	2	.....	.....	.....	.....	.....
12 pigs and shoats	3.5	.....	.....	.....	.....	(14)
2 mules	7	(4.5)	4	(4)	.....	2
Family meal	1.5	.....	.....	.....	.....	.....
Total	22	(22)	12	(11)	2	14

In the way of live-stock feed crops, the farm has planned for 30 acres of corn, 10 acres of oats and rye, 8 acres of cowpea and velvet bean hay and 65 acres of pasture. It has also provided 4 acres of peanuts for hog grazing. On the basis of the standards proposed in test 2, the stock requirements of this farm, as worked out in Table XVII, call for 2 more acres of oats, 3 more acres of cowpea hay, and 2 acres of sorghum for green feed. There is also a surplus of 8 acres of corn, for which other crops may be substituted, if desired.

The mule labor required by the additional family food crops and live-stock feed crops needed to meet the standards given are found in Table XVIII (p. 35). In the first line of that table are given the amounts of mule labor not used, as shown in Table XVI. Then follow the labor requirements of the additional maintenance crops in lines 2 to 7. The total requirements of these crops by months in line 8 are subtracted from the surplus mule labor, shown in the first line. The remainders in line 9 show a shortage of nearly one-fifth of a day in February, but there is sufficient surplus in January and March to take good care of this, as the work in these months is not definitely fixed as to time and can be shifted.

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Now, suppose we discard the surplus 8 acres of corn not needed for the farm feed and add the labor of these 8 acres to the mule labor that remains in line 9. In line 11, the totals resulting from these additions, will be found new monthly amounts of mule labor still available, and it is proposed that the most of this labor be utilized in growing more cotton, the principal commercial crop of the region.

We find the smallest amount of surplus mule labor in February, namely, 4.54 days. This divided by 0.64 days, the mule labor required for 1 acre of cotton in February, as found in Table XV, would limit us to not more than 7 acres. However, the labor during the three preparation months of January, February, and March is not definitely fixed as to time, and by shifting the work we can handle a larger acreage. It might be possible to handle 15 acres with the 28 days available for the three months. This number of acres might also possibly be taken care of in the month of June, which has the lowest amount of surplus mule labor in the planting and cultivation months. In both instances, however, we would be running on a very narrow margin, so we will proceed on the basis of adding 10 acres of cotton to use this surplus labor.

The labor requirements of the additional 10 acres of cotton are found in line 12 of the table. Subtracting these amounts from the available amounts in line 11, we still have a surplus of mule labor as shown in line 13. This surplus is largest in the last half of the year. It will be desirable, therefore, to add some crop that will use labor during the latter part of the year. Referring to Table XV, we find that we have such a crop for this region in late white potatoes, and it is proposed that we add 3½ acres of this crop. Also, as this crop occupies the ground only in the latter part of the year, it will be desirable to occupy the land during the early part of the year with some crop that does not require much spring and summer handling. We find such a crop in oats or rye, which may be grown for grain, for green feed, or for grazing, or to be turned under for soil improvement.

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The one-half acre of white potatoes for family use, with the 3½ now under consideration for market purposes, will require 4 acres of oats to precede them. We have 1 acre of the 12 acres of oats provided for the live stock that has no crop after it, so we will need 3 additional acres of oats.

The monthly labor requirements of the 3 acres of oats and the 3½ acres of potatoes appear in lines 14 and 15 of Table XVIII and the monthly sums in line 16. These amounts taken from the available time in line 13 still leave a good working surplus of mule labor.

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TABLE XVIII.—*Adjustment of crops to use surplus mule labor.*

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Mule labor not used (days)....(1)	[a]7.75	[a]2.08	[a]13.84	15.72	8.49	9.11	33.58	41.80	25.16	21.04	31.04	13.24	222.85
Crop requirements of—													
Garden vegetables, ¾ acre....(2)	0.29	0.76	1.39	1.09	0.79	0.52	0.68	0.60	0.47	0.41	.....	.....	.....
Fruit, ¾ acre....(3)	.78	.32	.....	.14	.27	.42	.14	.....	.....	.06	0.45	0.83	.....
Late white potatoes, ½ acre....(4)	.....	.....	.....	.....	.....	.....	.78	1.14	.41	.25	.50	.....	.....
Oats, 2 acres....(5)	.....	.....	.....	.....	.20	.62	.24	.....	1.76	1.74	.....	.....	.....
Cowpea hay, 3 acres....(6)	.....	.....	.....	.....	.....	1.32	.69	.....	1.26	.63	.....	.....	.....
Sorghum, 2 acres....(7)	.84	1.18	1.12	.78	1.24	1.10	.24	.24	.24	.....	.....	.94	.....
Totals....(8)	1.91	2.26	2.51	2.01	2.50	3.98	2.67	1.98	4.14	3.09	.95	1.77	.....
Subtract line (8) from line (1):													
Mule labor remaining....(9)	5.64	—.18	11.33	13.71	5.99	5.13	30.91	39.82	21.02	17.95	30.09	11.47	.....
Mule labor for 8 acres discarded corn....(10	3.36	4.72	4.48	3.12	4.50	3.44	.....	.....	.....	1.36	1.44	3.76	.....
Total mule labor in lines (9) and (10)....(11)	[b]9.00	[b]4.54	[b]15.81	16.83	10.49	8.57	30.91	39.82	21.02	19.31	31.53	15.23	.....
Cotton, 10 acres....(12)	[c]7.90	[c]6.40	[c]4.30	6.80	5.40	5.70	3.40	.....	1.80	2.00	1.90	6.00	.....
Subtract (12) from (11):													
Remaining mule labor....(13)	(*d*)	(*d*)	(*d*)	10.03	5.09	2.87	27.51	39.82	19.22	17.37	26.63	9.23	.....
Oats, 3 acres....(14)	.....	.....	.....	.....	.30	.93	.36	.....	2.64	2.61	.....	.....	.....
Late white potatoes, 3.5 acres....(15)	.....	.....	.....	.....	.....	.....	5.43	7.94	2.87	1.75	3.50	.....	.....
Total of (14) and (15)....(16)	.....	.....	.....	.....	.30	.93	5.79	7.94	5.51	4.36	3.50	.....	.....
Remaining mule labor (days); subtract (16) from (13)....(17)	(*d*)	(*d*)	(*d*)	10.03	4.79	1.94	4.72	31.88	13.71	12.95	26.13	9.23	125.59

[a] Total for January, February, and March, 23.17.
[b] " " " " " " 28.81.
[c] " " " " " " 18.60.
[d] " " " " " " 10.21.

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Our reconstructed crop system now stands as follows: Garden vegetables, 1 acre; fruit, ¾ acre; late white potatoes, 4 acres; sweet potatoes, 1 acre; sugar cane, ¾ acre; sorghum, 2 acres; corn, 22 acres; oats, 15 acres; cowpea hay, 11 acres; peanuts, 4 acres; cotton, 24 acres; or 70 acres of crop land and 85 acres of crops. This is 35 acres of crop land and 42½ acres of crops per mule, as compared with 29¾ acres of crop land and 33¾ acres of crops per mule as originally organized, and we are using 72 per cent of the mule labor as compared with 52 per cent under the old organization.

As reorganized, these crops can be arranged in a 4-field, 4-year rotation, as follows:

Field 1. 17 acres of cotton.

Field 2. 12 acres of corn with cowpeas, 4 acres of peanuts, 1 acre of sweet potatoes.

Field 3. 7 acres of cotton, 10 acres of corn with cowpeas.

Field 4. 15 acres of oats, followed by cowpeas and potatoes, 2 acres of sorghum.

This rotation does not include the vegetable garden, the fruit, and the sugar patch, which will not very well fit into the rotation.

This reorganization is worked out on the basis of mule labor being the main limiting factor. We have assumed that all the crops, including the additional cotton, can be handled by the family with such additional outside man labor as is available. It has been possible to extend the total acreage of crop land because of the large acreage of tillable pasture, which was in excess of live-stock needs.

Had there been no surplus tillable land on which to extend the crop area, it would be necessary to rent additional land until some of the woodland could be cleared or more land bought. Had no additional crop land been available, changes in the organization could have been made only by reducing acreages of some of the crops to make room for increasing the acreages of others or for adding new crops.

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The reorganization worked out here is not suggested as the best one for this farm. Others might have been presented, but this has been given simply to illustrate a method of testing and changing organization for efficiency in the use of mule labor. The effect of organization on efficiency in the use of man labor may be worked out in the same manner.

WORKING CAPITAL.

16. Is the working capital per mule adequate for efficient operation of the farm?

Here again the averages for the best farms of the community may be used as a measure in this test.

Tables XIX and XX give by way of illustration the working capital per mule and per farm and its distribution to live stock, implements and machinery, feed and supplies, and cash to run the farm, in the Sumter County and Brooks County farm communities, and as general standards for the regions in which these communities are located.

TABLE XIX.—*Distribution of working capital, working capital per mule, and working capital per farm on groups of Sumter County, Ga., farms.*

Farm groups.	Average value of—				Average cash to run farm per mule.	Average total working capital per mule.	Average total working capital per farm.
	Work stock per mule.	Productive live stock per mule.	Implements and machinery per mule.	Feed and supplies per mule.			
Best five 1-mule farms	$185	$53	$63	$34	$115	$450	$450
Best five 2-mule farms	195	79	68	140	115	597	1,194
Best five 3-mule farms	160	57	51	108	145	521	1,563
Best five 4-mule farms	196	43	54	102	114	509	2,036
Best five 5-mule farms	163	30	43	109	158	503	2,515
Best five 6-mule farms	108	23	60	98	93	382	2,292
Average for 30 farms	168	48	56	99	123	494	.....

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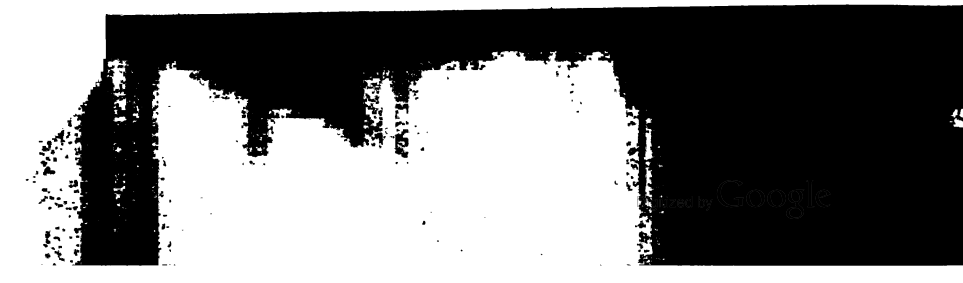
TABLE XX.—*Working capital per farm and per mule, and its distribution to work stock, productive live stock, implements and machinery, feed and supplies, and cash to run the farm for groups of farms in the Brooks County, Ga., community.*

Farm groups.	Average value of—				Average cash to run farm per mule.	Average total working capital per mule.	Average total working capital per farm.
	Work stock per mule.	Productive live stock per mule.	Implements and machinery per mule.	Feed and supplies per mule.			
Best five 1-mule farms.....	$136	$95	$40	$206	$11	$478	$478
Best five 2-mule farms.....	152	141	116	207	10	626	1,252
Best five 3-mule farms.....	159	109	106	192	25	591	1,773
Best five 4-mule farms.....	171	100	87	212	34	604	2,416
Best five 5-mule farms.....	217	90	87	167	20	581	2,905
Best five 6-mule farms.....	168	103	87	151	60	569	3,414
Average for 30 farms.....	167	106	87	189	26	575	.....

The tests and examples given in the foregoing pages deal with the most important and fundamental factors that influence efficiency in the management of the farm, and they are sufficient to illustrate the method suggested and also to give some general standards for use in the South until standards can be established for local communities.

OTHER TESTS.

Other tests may follow, dealing with the various items of expense, the sources of income, farm practice in caring for crops and live stock, the organization of the farm land as a whole, the size, shape, and general layout of the crop land with reference to greater efficiency in the use of labor and machinery, the location and plan of the farm buildings with reference to sanitation and convenience, and the saving of time and labor, and so on in as great detail as may be desired.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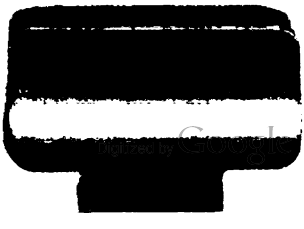

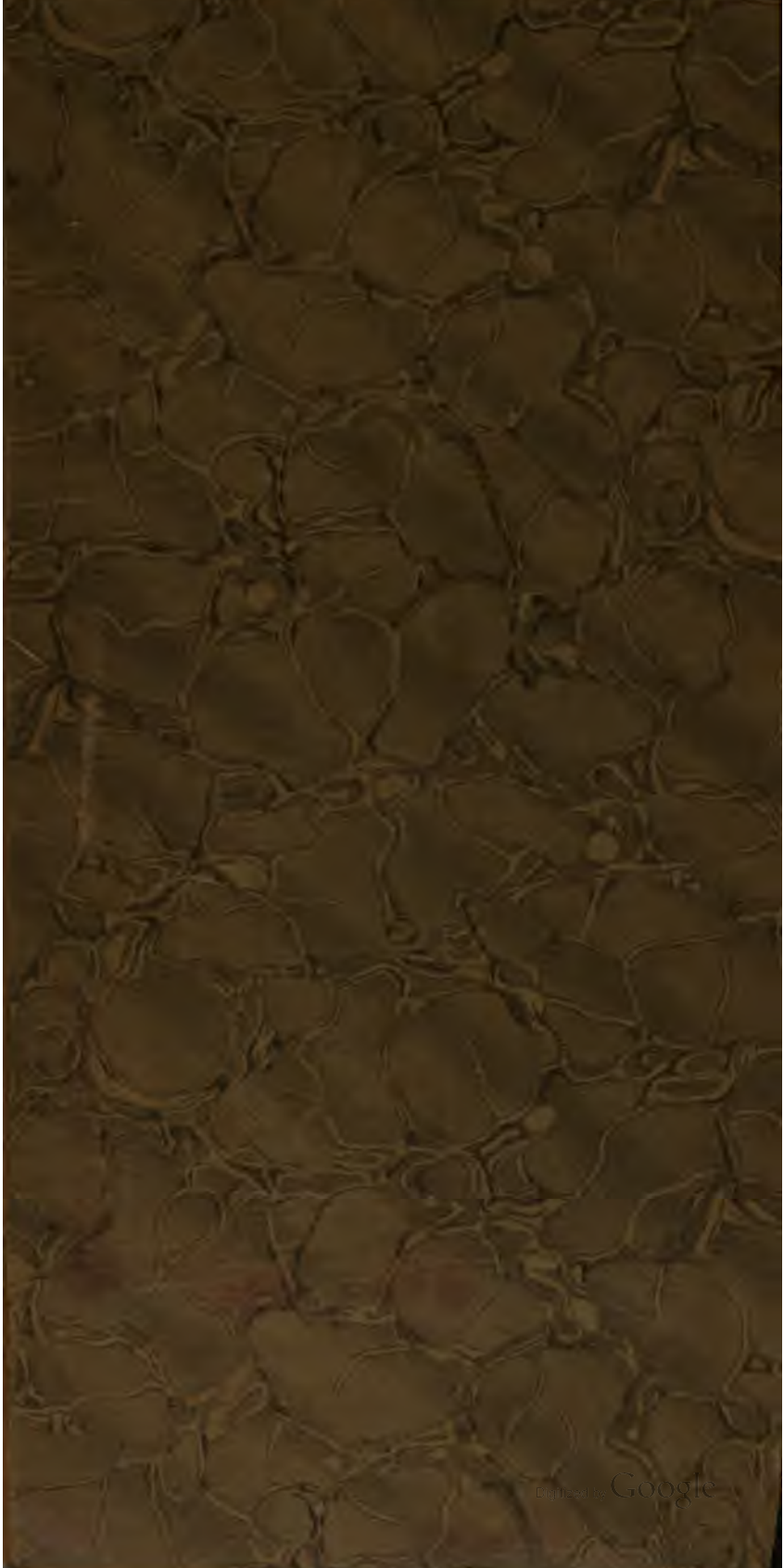
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